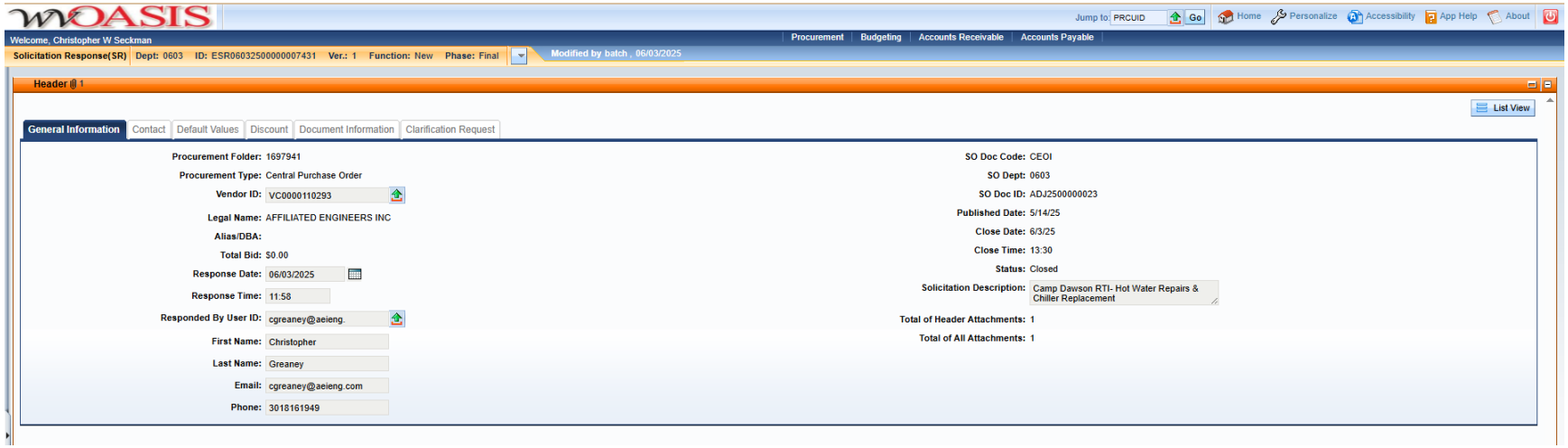
The following documentation is an electronically-submitted vendor response to an advertised solicitation from the *West Virginia Purchasing Bulletin* within the Vendor Self-Service portal at ***wvOASIS.gov***. As part of the State of West Virginia's procurement process, and to maintain the transparency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


WVOASIS
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About
Welcome, Christopher W Seckman
Procurement | Budgeting | Accounts Receivable | Accounts Payable
Solicitation Response(SR) Dept: 0603 ID: ESR06032500000007431 Ver.: 1 Function: New Phase: Final
Modified by batch , 06/03/2025
Header @ 1
List View
General Information
Contact
Default Values
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Document Information
Clarification Request
Procurement Folder: 1697941
Procurement Type: Central Purchase Order
Vendor ID: VC0000110293
Legal Name: AFFILIATED ENGINEERS INC
Alias/DBA:
Total Bid: $0.00
Response Date: 06/03/2025
Response Time: 11:58
Responded By User ID: cgreaney@aeieng.
First Name: Christopher
Last Name: Greaney
Email: cgreaney@aeieng.com
Phone: 3018161949
SO Doc Code: CEOI
SO Dept: 0603
SO Doc ID: ADJ2500000023
Published Date: 5/14/25
Close Date: 6/3/25
Close Time: 13:30
Status: Closed
Solicitation Description: Camp Dawson RTI- Hot Water Repairs & Chiller Replacement
Total of Header Attachments: 1
Total of All Attachments: 1

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:	1697941
Solicitation Description:	Camp Dawson RTI- Hot Water Repairs & Chiller Replacement
Proc Type:	Central Purchase Order

Solicitation Closes	Solicitation Response	Version
2025-06-03 13:30	SR 0603 ESR06032500000007431	1

VENDOR

VC0000110293
AFFILIATED ENGINEERS INC

Solicitation Number: CEOI 0603 ADJ2500000023

Total Bid: 0 **Response Date:** 2025-06-03 **Response Time:** 11:58:44

Comments: Thank you for the opportunity to respond to this Expression of Interest for the above referenced solicitation. Please note that as no fees are required at this stage of the procurement, we have recorded -$0- under Contract Amount.

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 Amount
1	Camp Dawson RTI- Hot Water Repairs & Chiller Replacement				0.00

Comm Code	Manufacturer	Specification	Model #
81101508			

Commodity Line Comments: Thank you for the opportunity to respond to this Expression of Interest for the above referenced solicitation. Please note that as no fees are required at this stage of the procurement, we have recorded -$0- under Contract Amount.

Extended Description:

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

The State of West Virginia

Camp Dawson RTI- Hot Water Repairs & Chiller Replacement

Response to Centralized Expression of Interest

June 3, 2025 |

AEI Affiliated Engineers

Affiliated Engineers, Inc.
19 W Colorado Boulevard
Pasadena, CA 91105
Tel 626.768.7636

June 3, 2025

State of West Virgina
Department of Administration
Purchasing Division
2019 Washington Street E
Charleston, WV 25305

Attn: Mr. David Pauline

Reference: State of West Virginia Camp Dawson RTI- Hot Water Repairs & Chiller Replacement

Dear Mr. Pauline:

On behalf of Affiliated Engineers, Inc (AEI), we are pleased to present our response to the Request for Proposal for the Camp Dawson RTI- Hot Water Repairs & Chiller Replacement. AEI has a long history of successful planning and subsequent implementation of design strategies for campus chilled water generation and distribution projects. The following proposal showcases our experience with similar type projects such as with the State of West Virginia.

AEI brings unique knowledge and skills with this specific team, including areas important to chilled water generation as well as domestic hot water distribution systems. These may include verification of design loads, capacities, and temperatures, assessing the current and future site loads, modeling hot water distribution systems, developing potential heat recovery chiller options, and implementing a plan for future expansion.

The development of both a hot water assessment study and chiller replacement design will require experience in utility operations, planning and evaluation as well as design. Our recent campus utility planning and design experience has focused not only on proven traditional methods and utility improvement options, but also on the intricacies of designing an efficient and sustainable generation system. A sampling of our recent clientele is presented below.

- Fort Bragg
- Fort Detrick
- Louis A. Johnson VA Medical Center
- NASA Johnson Space Center
- National Institute of Health
- National Institute of Standards and Technology
- Picatinny Arsenal
- The Pentagon
- The Architect of the Capitol
- U.S. Army Corps of Engineers

AEI has planned and designed new chilled water plants and distribution systems that have been installed across the country. As a result, we have faced and developed successful solutions for the major challenges posed by this project, which may include; planning for future load requirements, optimizing pumping configurations and temperature differential, phasing, and identifying deficiencies in existing systems.

AEI will draw upon our extensive practice in the evaluation of the RTI hot water system as well as our unique inclusion of professional engineers who are also licensed operating engineers. The system evaluation will be performed by our field services engineers who are merchant marine officers and licensed boiler operators. These skill sets can offer a unique perspective into operational enhancements and equipment reliability.

We believe the enclosed information will relay our strong credentials and enthusiasm for this project and our ability to assist you in making the best decisions. Thank you for this opportunity to present our qualifications and high level of interest for this challenging project, and we look forward to supporting the important mission of the State of West Virginia.

Sincerely,

Aaron Wickersham, P.E.
Principal
awickersham@aeieng.com

FIRM PROFILE

Since our inception, Affiliated Engineers, Inc., (AEI), has focused its practice on three primary market opportunities: energy and utilities, healthcare facilities, and academic campuses. As the firm has expanded from its original Madison, Wisconsin location into 20 offices located throughout the U. S., each one of these markets has grown as well.

Today, our energy and utilities practice includes a dedicated team of engineering professionals whose sole focus is utility systems. This includes experience with planning, analyzing, designing, constructing, commissioning start-up, as well as operating chilled water, steam and hot water, power, and distribution systems. AEI has had the opportunity to assist many clients with their master planning efforts as well as infrastructure implementation for existing and new campuses. For some campuses, such as the Johns Hopkins University, the University of Wisconsin-Madison and the University of North Carolina-Chapel Hill, AEI has performed continuous planning and design efforts for more than four decades.

200 MILES Thermal Utilities

100+ ENERGY MASTER PLANS for universities

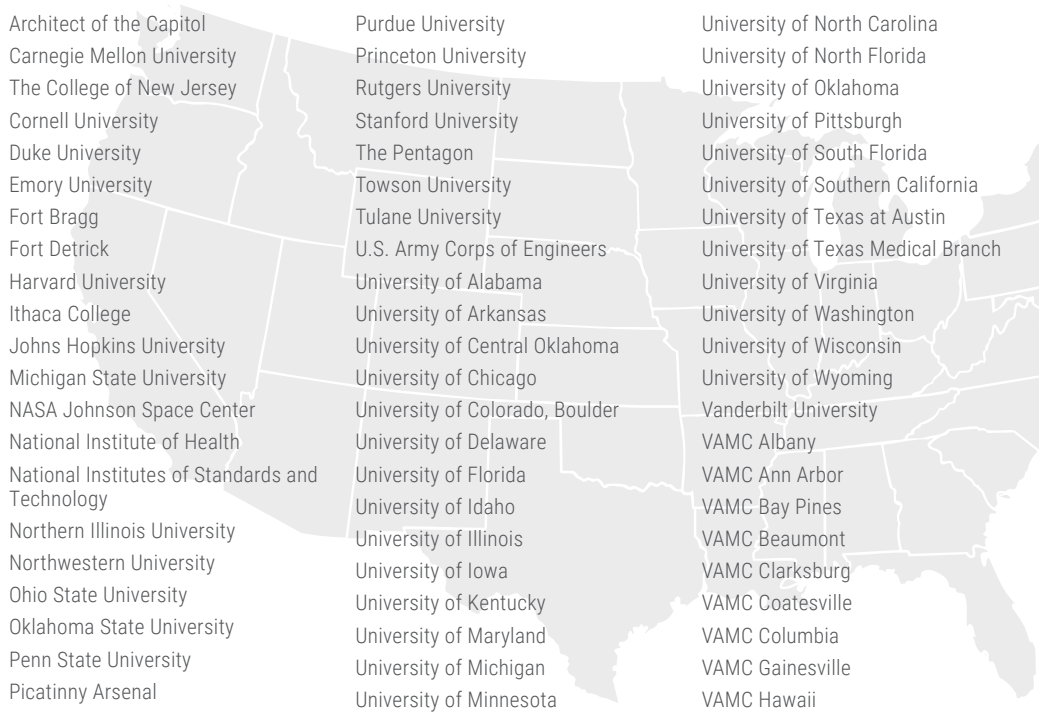
2.5 MILLION TONS Chilled Water

50 MILLION GALLONS of TES

3.25M KPPH Steam

500MW POWER GENERATION

10+ MILLION MMbtu hot water



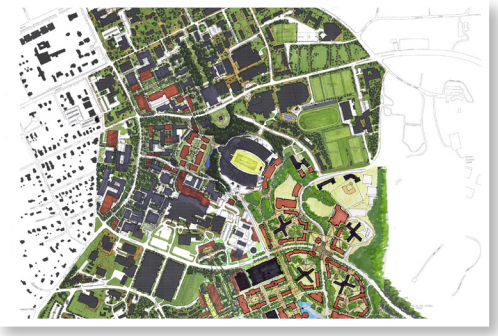
- Architect of the Capitol
- Carnegie Mellon University
- The College of New Jersey
- Cornell University
- Duke University
- Emory University
- Fort Bragg
- Fort Detrick
- Harvard University
- Ithaca College
- Johns Hopkins University
- Michigan State University
- NASA Johnson Space Center
- National Institute of Health
- National Institutes of Standards and Technology
- Northern Illinois University
- Northwestern University
- Ohio State University
- Oklahoma State University
- Penn State University
- Picatinny Arsenal
- Purdue University
- Princeton University
- Rutgers University
- Stanford University
- The Pentagon
- Towson University
- Tulane University
- U.S. Army Corps of Engineers
- University of Alabama
- University of Arkansas
- University of Central Oklahoma
- University of Chicago
- University of Colorado, Boulder
- University of Delaware
- University of Florida
- University of Idaho
- University of Illinois
- University of Iowa
- University of Kentucky
- University of Maryland
- University of Michigan
- University of Minnesota
- University of North Carolina
- University of North Florida
- University of Oklahoma
- University of Pittsburgh
- University of South Florida
- University of Southern California
- University of Texas at Austin
- University of Texas Medical Branch
- University of Virginia
- University of Washington
- University of Wisconsin
- University of Wyoming
- Vanderbilt University
- VAMC Albany
- VAMC Ann Arbor
- VAMC Bay Pines
- VAMC Beaumont
- VAMC Clarksburg
- VAMC Coatesville
- VAMC Columbia
- VAMC Gainesville
- VAMC Hawaii
- VAMC Lebanon
- VAMC Lee County
- VAMC Little Rock
- VAMC Loch Raven
- VAMC Miami
- VAMC Montrose
- VAMC Palo Alto
- VAMC Perry Point
- VAMC Phoenix
- VAMC Portland
- VAMC Providence
- VAMC St. Augustine
- VAMC Tampa
- VAMC Texas
- VAMC Washington D.C.
- VAMC Wilmington
- Virginia Tech
- Wake Forest
- Washington University in St. Louis
- Western Illinois University
- Wheaton College
- Yale University

Energy & Utilities Areas of Expertise

- Advanced Start-Up and Testing
- Alternative Energy
- Arc Flash & Coordination Studies
- Asset Evaluation and Testing
- Benchmarking
- Biomass Handling & Process Systems
- Building Energy Demand Management
- Combined Heat and Power
- Commissioning
- Condition Assessment
- Cost Estimating
- District Energy Plants
- Electrical Substations
- Emergency & Island Power
- Energy Analysis
- Heat Recovery
- Hydraulic Modeling
- Instrumentation & Controls
- Life Cycle Cost Analysis
- Operations
- Pipe Stress Analysis
- Power Transmission & Distribution
- Project Management
- Renewable Energy
- Steam to Hot Water Conversion
- System Analysis and Optimization
- Systems Configuration & Economics
- Telecommunications
- Thermal Storage and Distribution
- Utility Master Planning

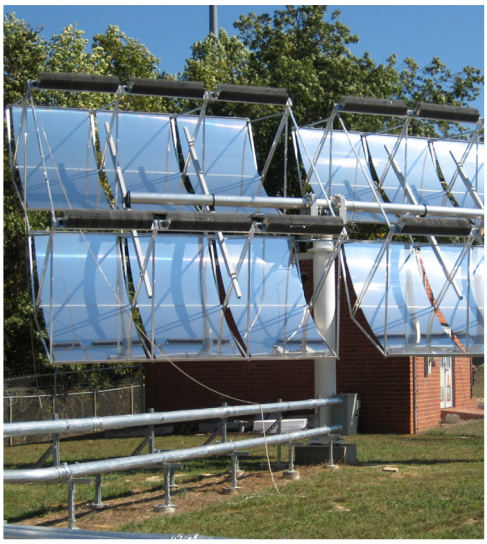
CHILLED WATER

AEI has delivered chilled water systems for a variety of public and private clients across the country for over three decades. We have designed and implemented nearly 1.8 million tons of chilled water on large multi-building campuses. Our experience with central chiller plants includes absorption and centrifugal chillers, a variety of chiller prime movers, and chilled water thermal storage. This experience also includes cooling tower analysis and selection for free cooling, control and instrumentation, load projection, and equipment planning for phased construction. In addition, we provide detailed hydraulic analysis to develop appropriate system arrangements for chilled water distribution, including buried, trenched, and tunneled networks.



MASTER PLANNING

Combining innovative approaches to utility production and distribution with an experienced understanding of issues that drive energy usage at the building and space level, AEI provides clients with the planning basis necessary to support the growth of their campus. Meanwhile, our sustainability planning capabilities allow us to develop aggressive, yet realistic, goals for energy use in campus facilities. We help our clients to explore energy and utility system solutions focused on long-term planning and life cycle cost analysis. This approach helps to ensure flexibility for future growth and load requirements, while functioning with optimum efficiency and reliability at current demand levels.



ALTERNATIVE AND RENEWABLE FUEL OPTION ANALYSIS

AEI has extensive experience in the analysis of both alternative and renewable fuel options for university campuses. As universities continue to sign the American College & University President's Climate Commitment (ACUPCC), campus energy supply becomes more critical to reducing carbon emissions and meeting carbon neutrality goals. AEI has great depth of knowledge in providing economic and feasibility analysis and prioritizing options based on a particular campus' needs for:

- » Anaerobic Digestion
- » Wind Power
- » Landfill Gas for CHP
- » Digester Gas for CHP
- » Municipal Solid Waste
- • Combustion of Woody Biomass
- • Geothermal
- • Poultry Litter for Combustion
- • Solar PV
- • Solar Thermal

AEI also has vast experience in waste heat recovery through heat recovery chillers or other unique applications. Finally, we have extensive experience in water re-use and conservation measures for central plants, including blowdown water recovery, cooling coil condensate capture and re-use, stormwater re-use, and reclaimed water use.

STEAM, HOT WATER, AND HIGH TEMPERATURE HOT WATER

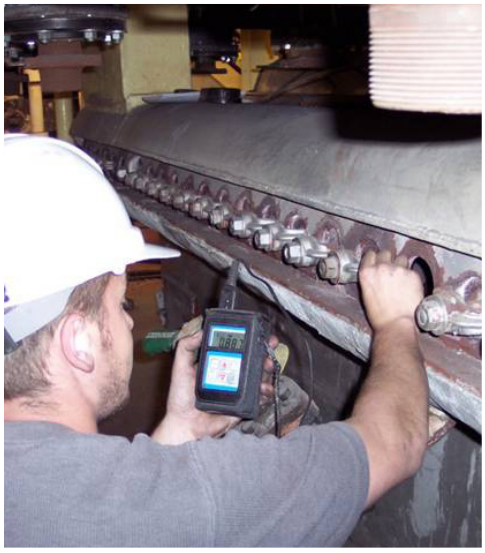
AEI's central heating plant expertise is based upon an in-depth understanding of energy usage and converting processes. We understand the importance of a systems approach to design. Our expertise spans gas, oil, and solid fuel systems. AEI has extensive experience designing steam systems for low- and high-pressure applications as well as for hot water heating systems. This experience includes obsolescence studies, new central heating plants, cogeneration prime movers, and the conversion of buildings from steam to hot water systems.

THERMAL ENERGY STORAGE

AEI is extremely knowledgeable in the implementation of Thermal Energy Storage (TES) systems, which can provide operational flexibility for existing and new chilled or hot water systems. In some circumstances, the tank can be used as redundant backup for routine equipment outages, discharged in the case of an unexpected failure of existing installed equipment, or, in an emergency, such as a power outage, when chiller capacity may not be available to operate. Beyond operational flexibility, AEI has been able to secure considerable operational cost savings for our clients through use of the tank as an economic tool; the tank can help to limit the operation of electric driven chillers during peak operation and thereby reduce the peak electrical load on campus and related electrical energy costs economic benefits that deploy assets in a demand-response program.

ELECTRICAL GENERATION AND DISTRIBUTION

AEI's experience with electrical generation and distribution systems ranges from high-voltage systems up to 138 kV, as well as medium- and low-voltage systems which support some of the largest institutions in the nation. Our designs prioritize the cost/benefit impact to the owner and evaluate opportunities to increase reliability and provide improved system redundancy. Strategies include system interconnections and dual purposing of on-site electric generation systems (standby or cogeneration) to provide operational benefits. These strategies provide alternative power and economic benefits that deploy assets in a demand-response program.



BOILER PLANT COMMISSIONING AND START-UP

AEI provides commissioning and start-up services for central plants and CHP system applications. The firm has provided combustion services for a variety of fuels, including coal, natural gas, biomass (solid, liquid, gas) and solid waste systems. In addition to conventional commissioning services, AEI routinely provides start-up services for infrastructure projects. These services generally expedite the beneficial use of new assets by providing proactive services between the various construction activities and suppliers. Typical tasks associated with boiler start-up services included point-to-point wiring checks, establishment and/or checking of burner fuel air curves, and tuning of control circuits.

Our field services team members – all of whom are licensed plant operators and the majority licensed professional engineers – provide the following services:

- » Non-Destructive Testing
- » Infrared Thermal Imaging
- » Combustion/Emission Testing
- » Condition Assessments
- • Maintenance Evaluations
- • Chemical Treatment Systems
- • Standard Operating Procedures
- • Operations Assessment

COMBINED HEAT AND POWER (CHP)/COGENERATION SYSTEMS

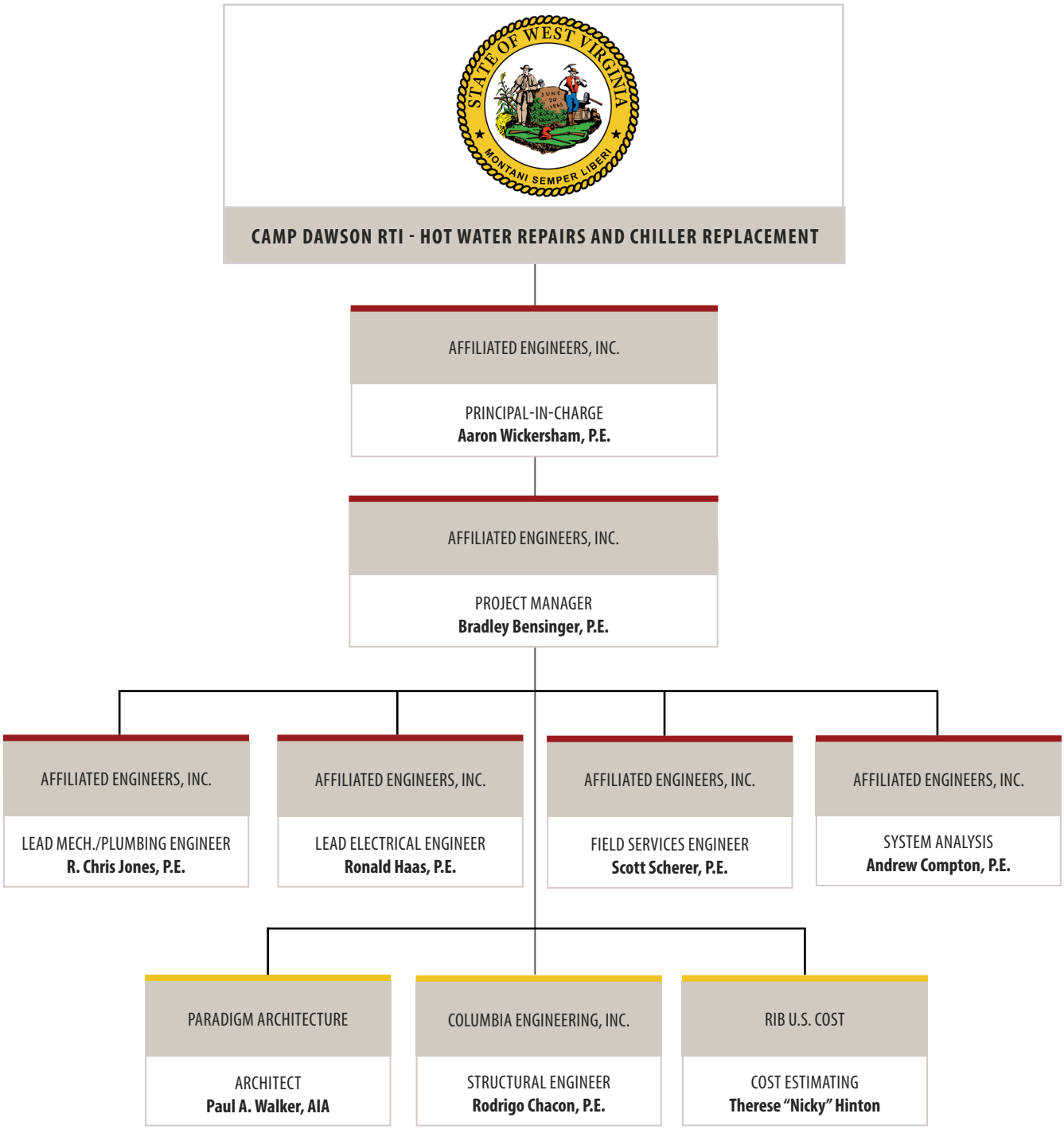
AEI has provided preliminary planning, designing, start-up, and commissioning services for nearly 400 MW of CHP installations, ranging from 1.0 MW to 84 MW. This experience reflects AEI's unique ability to identify solutions that maximize the value of a cogeneration plant for our clients – solutions as unique as the clients themselves. We take into account differences in energy economics, client knowledge and skill, capital constraints, site issues, reliability goals, fuel flexibility goals, energy contracting ability, electric utility interconnection rules and regulations, parasitic loads, equipment availability, environmental issues, and other project-specific drivers and constraints.

ORGANIZATIONAL CHART

Before AEI pursues any project, we carefully review project requirements to assess team qualifications and availability. Our success is based on the careful examination of talent to strategically place team members on projects where their knowledge and expertise is best utilized. The assigned team will remain on the project for the duration and will successfully deliver a project that aligns with the needs of the State of West Virginia.

What our team brings to the State of West Virginia :

- Dedicated staff, particularly experienced with chilled water generation and hot water distribution systems
- System evaluations done by licensed operators
- Hot water hydraulic modeling experience
- Adherence to budget and schedule



AARON J. WICKERSHAM, P.E.

Project Role: Principal-in-Charge

EXPERIENCE AND KEY PROJECTS

Mr. Wickersham has extensive experience in the planning and design of mechanical systems serving higher education, federal, and industrial buildings and campuses. Mr. Wickersham has performed numerous utility master plans, which include the optimization of steam, hot water, and chilled water generation and distribution systems through detailed heat balance, life cycle cost, and hydraulic modeling programs. Additionally, he has performed several building-focused energy assessments and HVAC evaluations, as well as combined heat and power analysis.

University of Pittsburgh - Comprehensive Energy Master Plan - Pittsburgh, Pennsylvania
Project Manager and System Analyst for the energy master plan. Project included an evaluation of the chilled water, steam, hot water and electric generation and distribution systems. Recommendations were based upon life cycle cost analysis, hydraulic modeling, greenhouse gas reduction and energy conservation. Proposed projects include interconnecting independent district chilled water plants to maximize use of high-efficient chillers, installation of a 4.6 MW combined heat and power system, installation of heat recovery chillers in the upper campus, as well as new steam generation equipment.

West Virginia University - Comprehensive Energy & Utility Master Plan - Morgantown, West Virginia
Principal-in-Charge and System Analyst for the development of a utility master plan to assist the University in an on-going strategy for heating and cooling the campus facilities. The master planning efforts included an evaluation of the centralized Building Automation Controls, sustainability benchmark, plant condition assessment and the approach to steam generation. Building energy audits were performed and recommended energy conservation measures were presented.

The University of Kentucky - Utility Master Plan - Lexington, Kentucky
Project Manager and System Analyst for a comprehensive Utility Master Plan of the campus chilled water, steam and electrical utility systems. Project included a condition assessment of the three heating plants equipment, life cycle cost analysis for future heating system evaluation, and hydraulic modeling of the steam distribution system. Recommendations included over 50 ECM and improvement items including deaerator replacement and boiler inspections at the Central Heating Plant No. 2.

Pentagon - Chiller Replacement Study - Washington, D.C.
Project Manager and Mechanical Engineer in the development of a chilled water master plan and energy conservation measures (ECM). The plan included a phased replacement of three 4,000 ton chillers and the incorporation of a thermal energy storage tank to reduce energy consumption and carbon emissions.

Johns Hopkins University - South Plant Chiller Replacement - Baltimore, Maryland
Principal-in-Charge for the design and commissioning of two 2,000 ton duplex chillers in the South Plant. Project also included chilled water distribution piping upgrades and a new steam to hot water conversion heat exchanger.

The University of Texas Medical Branch - Infrastructure Transformation Project - Galveston, Texas
Mechanical Systems Analyst for damage assessments and repair plans for major systems after flooding across the 85 acre campus following Hurricane Ike, which was one of the nation's most expensive natural disasters. Extensive repair plans were prepared for multiple mechanical, electrical, and plumbing systems.

Johns Hopkins University - Campus Utility Master Plan Update - Baltimore, Maryland
Principal-in-Charge and Project Manager for ongoing utility master planning to evaluate the heating requirements of planned expansions to the campus. Most recently, the utility master plan was completed in 2023. Recommendations included 4,000 tons of replacement chilled water generation and optimizing existing plant operation with electric deregulation. Based upon hydraulic modeling of the campus chilled water and steam distribution systems, it was recommended to interconnect the Homewood campus distribution system with the adjacent Wyman Park System.

EDUCATION

Bachelor of Science
Mechanical Engineering
University of
Maryland (1995)

REGISTRATION/ CERTIFICATION

Registered Professional Engineer - Maryland (2001)

SPEAKING ENGAGEMENTS

Speaker -
"University of Illinois Utility Master Plan and Dispatch Model"
2017 IDEA
Annual Conference
and Trade Show

Speaker -
"Johns Hopkins South Plant Utilities"
2018 IDEA
Annual Conference
and Trade Show

Speaker -
"The Pennsylvania State University Steam to Hot Water Conversion Study (Level 1 Investigation)"
2019 IDEA
Annual Conference
and Trade Show

EMPLOYMENT HISTORY

Total Years: 25 years;
21 with AEI

BRADLEY BENSINGER, P.E.

Project Role: Project Manager

EXPERIENCE AND KEY PROJECTS

Mr. Bensinger has over 26 years of experience in project management, mechanical and plumbing design and construction for both mechanical infrastructure systems as well as building HVAC systems. Mr. Bensinger's concentration is the mechanical systems design of hot water, steam and chilled water generation and distribution systems.

West Virginia University - Comprehensive Energy & Utility Master Plan - Morgantown, West Virginia
Project Manager for the development of a study to evaluate existing chilled water generation systems and building energy conservation measures. Existing distribution systems were hydraulically modeled to identify deficiencies and recommendations were provided.

Architect of the Capitol - Refrigeration Plant Revitalization - Washington, D.C.
Project Manager for the multi-year revitalization of the AOC 42,000 ton east and west refrigeration plant. Initial phases included the design of two 2,700 ton variable speed chillers, two new field erected 5,000 ton variable speed chillers and three new 12,500 gpm cooling tower cells. New field erected cooling towers include variable speed controlled 300 hp fans to double the existing plant heat rejection capacity.

U.S. Army Corps of Engineers – Central Utility Plant & Utilidor - Fort Detrick
Project Manager for the design and commissioning services of a new Central Utility Plant and steam and chilled water distribution systems. The new steam distribution system consisted of preinsulated piping, several additional vaults and connections to both existing utility tunnels and taps for future buildings. New boiler plant and refrigeration plant control systems were provided for the central utility plant which optimized the operation of both systems via supervisory control strategies. Stress analysis was performed on all future piping utilizing Triflex software.

Johns Hopkins University – South Plant Chiller Upgrades - Baltimore, Maryland
Project Manager for the replacement of two chillers in the South Plant with 2,000 ton duplex centrifugal chillers. New chilled water and condenser water pumping as well as cooling towers were installed. A new plant addition was constructed and an architectural screening wall was erected to improve aesthetics of the south quad.

Johns Hopkins Hospital North Energy Plant Chilled Water System Upgrade - Baltimore, Maryland
Project Manager for multi-year project to replace/upgrade a significant portion of the Johns Hopkins North Energy Plants chilled water equipment. The overall project replaces six 1,430 ton chillers with seven 2,800 ton chillers inclusive of piping, pumping, and cooling towers. Significant upgrades to the plant electrical distribution were also performed.

University of Maryland – Chilled Water System Upgrades - Baltimore, Maryland
Project Manager for a chilled water distribution piping project interconnecting four independent plants. Project included direct buried and in-building supply and return piping as well as distribution pump and controls upgrades. AEI performed design services as well as project management of civil and structural engineering services.

Johns Hopkins Hospital - South of Orleans Expansion Energy Plant - Baltimore, Maryland
Project Manager for the design of a new 21,000 ton chilled water plant for the Johns Hopkins Hospital. The project included a new 15kV, 65 MVA utility service with 7.5 MW of onsite generation capability and replacement of the hospital's main electric distribution system.

EDUCATION

Bachelor of Architectural Engineering The Pennsylvania State University (1995)

REGISTRATION/ CERTIFICATION

Registered Professional Engineer - Maryland (2003)

EMPLOYMENT HISTORY

Total Years: 26 years; 15 with AEI

R. CHRIS JONES, P.E.

Project Role: Lead Mechanical Engineer

EXPERIENCE AND KEY PROJECTS

Mr. Jones has 17 years of experience in project management and mechanical design, construction, and commissioning of infrastructure systems including chilled water, hot water, steam, and combined heat and power. Mr. Jones has completed numerous chilled water plant design projects ranging in capacity from 200 Tons to 40,000 Tons. He has experience optimizing pumping strategies, distribution systems and controls systems.

Architect of the Capitol - Refrigeration Plant Revitalization - Washington, D.C.
Lead Mechanical Engineer for the multi-year revitalization of the AOC 42,000 ton east and west refrigeration plant. Initial phases included the design of two 2,700 ton variable speed chillers, two new field erected 5,000 ton variable speed chillers and three new 12,500 gpm cooling tower cells. New field erected cooling towers include variable speed controlled 300 hp fans to double the existing plant heat rejection capacity.

Architect of the Capitol – Boiler Feedwater & City Water Piping Replacement - Baltimore, Maryland
Lead Mechanical Engineer for the replacement of Feedwater and City Water systems serving the Boiler Plant, Refrigeration Plant, and Admin Building. Project added resiliency and flexibility to these systems. Separate, metered Process Water and Domestic Water Systems created.

Johns Hopkins University – South Plant Chiller Upgrades - Baltimore, Maryland
Lead Mechanical Engineer for the replacement of two chillers in the South Plant with 2,000 ton duplex centrifugal chillers. New chilled water and condenser water pumping as well as cooling towers were installed. A new plant addition was constructed and an architectural screening wall was erected to improve aesthetics of the south quad.

Johns Hopkins University – Homewood Campus South Plant Chiller No. 4 - Baltimore, Maryland
Lead Mechanical Engineer for the installation of a new 2,700 ton replacement water cooled chiller at the Johns Hopkins University South Chiller Plant. Project included chilled water and condenser water pump replacement as well as two new cooling tower cells. AEI managed architectural, civil and structural sub-consultants and provided construction administration, start-up assistance and commissioning services as well.

Towson University - New Satellite Utility Plant - Towson, Maryland
Lead Mechanical Engineer for the design of the campus central utility plant addition and campus chilled water and steam piping expansion. This project included approximately 600 linear feet of new 10" steam distribution / 6" condensate piping system installed in a new walkable utility tunnel. AEI managed the civil, structural and architectural subconsultants to implement the project. The Central Utility Plant Addition included three nominal 1,500 ton chillers and a 20,000 pph steam boiler.

Johns Hopkins Hospital North Energy Plant Chilled Water System Upgrade - Baltimore, Maryland
Lead Mechanical Engineer for multi-year project to replace/upgrade a significant portion of the Johns Hopkins North Energy Plants chilled water equipment. The overall project replaces six 1,430 ton chillers with seven 2,800 ton chillers inclusive of piping, pumping, and cooling towers. Significant upgrades to the plant electrical distribution were also performed.

Architect of the Capitol – Calibrated Control Module - Washington, D.C.
Lead Mechanical Engineer for the evaluation of several available control systems capable of monitoring Capitol Power Plant and Capitol Complex data points and providing real time monitoring, identification of potential problems, and recommendations for improvements. The calibrated model of the plant and distribution system provides real time data to the control system to optimize plant and distribution system operations.

EDUCATION

Bachelor of Science
Mechanical Engineering
University of Delaware

REGISTRATION/ CERTIFICATION

Professional Mechanical Engineer - Maryland (2016)

EMPLOYMENT HISTORY

Total Years: 18 years;
18 with AEI

RONALD HAAS, P.E.

Project Role: Lead Electrical Engineer

EXPERIENCE AND KEY PROJECTS

Mr. Haas specializes in the planning, design, and construction of campus-wide electrical infrastructure systems for health care, higher education, federal government, and corporate research clients across the U.S. His expertise is in the analysis and design of medium- and low-voltage electric distribution systems to provide maximum system flexibility and redundancy with full consideration given to system operation and maintainability.

EDUCATION

Bachelor of Science
Applied Science
Electrical Engineering Technology
Youngstown State University (1989)

REGISTRATION/ CERTIFICATION

Registered
Professional Engineer -
Pennsylvania (1998)
Maryland (1999)
Virginia (2000)
District of Columbia (2000)

EMPLOYMENT HISTORY

Total Years: 34 years;
21 with AEI

George Mason University - Plant Expansion Phase II - Fairfax, Virginia
Lead Electrical Engineer for central heating and cooling plant expansion project adding 1,500 tons of additional chilled water generation and 25 MMBH of high temperature hot water boilers. Project included a new incoming electric service from Virginia Power, along with service power switchgear, to support the added loads.

Architect of the Capitol - West Refrigeration Plant Expansion - Washington, District of Columbia
Lead Electrical Engineer for a new chilled water plant which included three (3) 5,400 ton chillers, primary/secondary chilled water pumping systems, new electrical gear, new state-of-the-art distributed controls systems for both steam and chilled water. The project included a new 15kV, 40MVA utility service to support a total build out of 30,000 tons of chilled water generation. The project also included relocation of the existing coal storage and handling/conveying facility and with new electric services to the existing heating plant. The electrical system design includes N+1 redundancy throughout the electrical system.

Johns Hopkins Hospital - Blalock Substation Renovation - Baltimore, Maryland
Lead Electrical Engineer for the total replacement of the Blalock Building's main 480/277 volt service switchgear. Due to the restricted access, the design had to include a construction route for the equipment removal and installation using the loading dock of an adjacent building. Upgrades to the substation were required to increase capacity, provide future expansion, and bring the existing system up to current electrical and safety codes.

University of Texas Medical Branch - Hurricane Ike Infrastructure Recovery - Galveston, Texas
Lead Electrical Engineer for combined heat and power (CHP) portion of the new East Utility Plant, part of a campus-wide recovery effort following Hurricane Ike. The East Plant's CHP system is comprised of a 5.6 MW combustion turbine (CT) and a 2.6 MW steam driven turbine. The total output of the CHP system produces 8 MW of electric power and 25,000 PPH unfired / 75,000 PPH fired steam at 250 psi.

Johns Hopkins University - Homewood Campus Cogeneration - Baltimore, Maryland
Electrical Engineer for the installation of a combined heat and power (CHP) system as a new 7,000 sf addition to the existing Central Power Plant. The CHP consists of a combustion turbine and heat recovery steam generator, and operates as a base load unit generating 4.6 MW of electric at 13.2 kV and 25,000 PPH steam at 125 psig. The steam output is connected to the existing campus steam distribution system to supplement existing boiler steam generation to serve existing and future loads, while the electric output operates in parallel with the campus electrical distribution system through a new switchgear lineup equipped with utility metering to offset existing and future electric demand. AEI also provided startup and commissioning services.

Capitol Power Plant- WRP 480V Switchgear SCADA Integration - Washington, D.C.
Project Manager and Lead Electrical Engineer for the integration of the 480/277V Power Switchgear installed under RPR Phase 4 into the existing AOC SCADA System. Project included fast track design including specifications and detailed control drawings utilizing switchgear shop drawings & expansion of the CPP's existing SEL SCADA equipment.

SCOTT SCHERER, P.E.

Project Role: Lead Field Engineer

EDUCATION

Bachelor of Science
Marine
Engineering Systems
Merchant Marine
Academy (1995)

REGISTRATION/ CERTIFICATION

Registered
Professional Engineer
Maryland (2001)

NCEES
Certified Plant
Engineer (2001)

U.S. Coast Guard License
EPA Universal Refrigeration
Certification

Commissioned Officer
U.S. Navy Reservist,
Honorable Discharge

First Grade Stationery
License, Maryland

EMPLOYMENT HISTORY

Total Years: 28 years;
20 with AEI

EXPERIENCE AND KEY PROJECTS

Mr. Scherer has 28 dedicated years of experience in the condition assessment, construction, commissioning, and operation of mechanical heating plants and chilled water systems serving higher education, industrial, and federal campuses. He is a commissioned officer in the United States Navy and a Licensed Engineering Officer with the United States Coast Guard. Mr. Scherer has an unlimited license for the operation of boilers, engines, and combustion turbines.

University of Pittsburgh - Condition Assessment and Energy Master Plan - Pittsburgh, Pennsylvania
Performed a condition assessment of the steam generation and distribution systems. The Carillo Steam Plant consists of six 115,000 pph boilers and associated auxiliaries, including three deaerators, feedwater pumps, condensate handling, compressed air equipment, among others. Recommendations included such items as replacing all butterfly valves with gate valves, replacing several pressure reducing stations, and relocating boiler CEMS.

Johns Hopkins University - Utility Master Plan - Baltimore, Maryland
Performed a condition assessment of the existing generation assets, including two interconnected chilled water plants, as well as a steam and combined heat and power plant. Recommendations included chiller replacement, cooling tower nozzle replacement, and replacement of several boiler auxiliary systems.

Wheaton College - Boiler Plant and Steam Distribution Condition Assessment - Wheaton, Illinois
Field engineer for a condition assessment of existing boiler plant, steam distribution vaults, and building supply side mechanical systems. The assessment identified several energy savings opportunities and potential hazardous conditions that led to a steam to hot water conversion project.

Architect of the Capitol - Boiler Plant Operations Analysis & Master Plan - Washington, District of Columbia
Operations Engineer for an analysis of the condition, efficiency and staffing of the Capitol Power Plant. The analysis and field testing resulted in a significant annual savings without capital improvements. The reduction of gas co-firing, fuel balancing, and reorganization of staff personnel resulted in approximately $7,500,000 per year in operation savings.

University of Virginia - Energy and Utility Master Plan and Cogeneration Study - Charlottesville, Virginia
Project Engineer for a new comprehensive Energy and Utilities Master Plan, involving assessment of existing systems and future loads, and a detailed analysis of cogeneration options, including investigation of natural gas capacity and providers.

University of Illinois at Urbana-Champaign - Condition Assessment & Utility Master Plan - Champaign-Urbana, Illinois
Field Engineer for the Utility Master Plan that included a comprehensive engineering and economic analysis of existing utility systems and envisioned improvements to provide a framework for utility infrastructure development through the year 2030, with a goal of reducing carbon use emissions 25% by 2020.

Purdue University - Boiler Plant Condition Assessment (Coal Plant) - East Lafayette, Indiana
Field Engineer for a condition assessment and determination of operational availability of a 840,000 pph coal plant with 40 mw of electric generation Mr. Scherer also performed an evaluation of the existing operating methodology of the plant as well as a detailed reliability analysis of the steam generation systems.

ANDREW COMPTON, P.E.

Project Role: Systems Analyst

EXPERIENCE AND KEY PROJECTS

Andrew is a mechanical engineer who specializes in the planning, condition assessment and commissioning of steam, hot water, chilled water and combined heat and power systems. Recent experience includes the hydraulic modeling of multi-plant chilled water, steam and hot water distribution systems and commissioning of a 100,000 pound per hour boiler and auxiliary systems as well as internal inspections of five 75,000 pound per hour watertube boilers.

EDUCATION

Bachelor of Science
Mechanical Engineering
Widener University (2016)

REGISTRATION/ CERTIFICATION

Professional Mechanical Engineer - Maryland (2024)

EMPLOYMENT HISTORY

Total Years: 9 years;
9 with AEI

West Virginia University - Energy and Utility Master Plan - Morgantown, West Virginia
Project Engineer for the development of a utility master plan for the Downtown and Evandale campuses. A condition assessment of the campus building mechanical rooms was conducted and recommendations were provided for several upgrade projects. A hydraulic model of the campus chilled water and steam distribution systems was completed and recommendations included replacement of undersized piping and the creation of several campus loops to provide additional system redundancy.

University of Pittsburgh - Comprehensive Energy Master Plan - Pittsburgh, Pennsylvania
Systems Analyst for an Energy Master Plan of the campus hot water, chilled water, and steam infrastructure systems. Evaluations included hydraulic modeling of hot water and chilled water distribution and pumping systems, life cycle cost comparisons of various system improvements, and a condition assessment of plant equipment.

University of Southern California – Heating System Study - Los Angeles, California
Systems Analyst for the development of a comprehensive hot water and steam master plan. The plan included a detailed condition assessment and evaluation of existing plant generation, and building hot water systems. Hydraulic modeling was performed for the steam and hot water distribution systems identifying choke points and undersized piping locations.

University of Virginia - Energy & Utility Master Plan & Cogeneration Study - Charlottesville, Virginia
Mechanical Systems Analyst for a new comprehensive Energy and Utilities Master Plan, involving assessment of existing systems and future loads, distribution system hydraulic modeling, and a detailed analysis of cogeneration options, including investigation of natural gas capacity and providers. The steam and hot water distribution system hydraulic modeling included identification of several undersized piping segments and required modifications to support future campus loads.

Johns Hopkins University - Campus Utility Master Plan Update - Baltimore, Maryland
Project Engineer for a utility master plan to evaluate the cooling and heating requirements of planned expansions to the campus. Duties included development of a steam distribution and condensate return hydraulic models. Based upon hydraulic modeling of the campus utility distribution systems, it was recommended to interconnect the Homewood campus distribution system with the adjacent Wyman Park System for redundancy and to alleviate choke points in the systems.

Virginia Polytechnic Institute and State University - Utility Master Plan - Blacksburg, Virginia
Project Engineer for the development of a utilities master plan for the southwest area of campus, including hydraulic modeling, development of future load projections, analysis of all potential heating/ cooling options, consideration of economics and life cycle cost analysis, and the establishment of a phased utility implementation plan to synchronize with proposed campus growth. A hydraulic model of the campus steam distribution system was developed to evaluate the addition of a second steam generation plant and the incorporation of the several future facilities.

PAUL A. WALKER, AIA (PARADIGM ARCHITECTURE)

Project Role: Architect

EXPERIENCE AND KEY PROJECTS

Paul has 42 years of experience as an architect and received his registration in 1986. He became a business owner in October 2000 when he created Paradigm Architecture. Paul's design responsibilities include programming, development of construction documents, project management, and construction administration. Among the variety of projects he has designed and supervised are: medical, commercial, corporate, educational, governmental, industrial, institutional, recreational, religious, and residential.

The scope of projects ranges from a few thousand dollars to over 70 million dollars. Paul also has extensive experience with commercial and corporate facilities as well as higher education facilities while working at other firms in WV, NC, and AL.

EDUCATION

Bachelor of Architecture
University of Tennessee
Knoxville, 1982

REGISTRATION/ CERTIFICATION

Registered Professional Engineer -
West Virginia #2626
Alabama #5398
Arizona #54615
Arkansas #10351
Florida #AR95045
Georgia #RA015225
Louisiana #7761
Maryland #17612
Massachusetts #31979
Mississippi #4652
Missouri #2014015049
North Carolina #4910
Ohio ARC.2118431
Oregon #ARI-12853
Pennsylvania #RA405117
South Carolina #8238
Tennessee #104766
Texas #24245
Virginia #401015994

National Oceanic and Atmospheric Administration
HDDC-B Data Center Expansion - Vertex Building
Fairmont, West Virginia

West Virginia University - Parkersburg
New Science Wing Fit-Up & Lab Classrooms
Parkersburg, West Virginia

West Virginia University
Greenhouse & Labs
Morgantown, West Virginia

Mon County Extension Building @ Mylan Park
Morgantown, West Virginia

The Aquatic Center and Track Facility @ Mylan Park
Morgantown, West Virginia

WVU B&E Startup Engineer & Accelerator Space
Morgantown, West Virginia

West Virginia University Medicine Center for Hope & Healing @ Mylan Park
Morgantown, West Virginia

Mylan Park Master Plan
Morgantown, West Virginia

Mylan Park Ruby Center Addition
Morgantown, West Virginia

Davis & Elkins College Athletic Center
Elkins, West Virginia

West Virginia University Visitor's Resource Center
Morgantown, West Virginia

West Virginia University Coliseum Visitor's Center
Morgantown, West Virginia

West Virginia University Stadium Press Box Suites Renovation
Morgantown, West Virginia

RODRIGO CHACON, P.E. (COLUMBIA ENGINEERING, INC.)

Project Role: Structural Engineer

EXPERIENCE AND KEY PROJECTS

Mr. Chacon is a licensed Professional Engineer and has been involved in the design of steel, concrete, masonry, and timber structures since 1979. Among the many types of structures he has designed are power plants, educational facilities, libraries, municipal buildings, senior centers and housing, laboratories, research and development buildings, fire stations, office buildings, garages, museums, theaters, warehouses, shopping centers, industrial buildings, and hospitals. Mr. Chacon has supervised the production of contract structural drawings and specifications, directed coordination with other disciplines, and is responsible for quality control. He has also performed numerous field inspections and structural surveys. His project experience includes:

Johns Hopkins Hospital North Energy Plant Redevelopment, Phases I-IV, Baltimore, Maryland
Structural Engineer for an analysis of the structural components of the 125,000 SF, three-story plant, as well as subsequent design and construction administration services for the removal and replacement of all roof-mounted cooling towers, 10 chillers, pumps, electrical gear, transformers, and piping. Prepared drawings for a 24,000 SF elevated steel platform to support the new cooling towers.

Morgan State University Campus Utility Upgrade – Phase IV, Part II, Baltimore, Maryland
Structural Engineer for an analysis of the existing framing to determine if it could support new cooling towers and chillers. Provided schematic design, design development, construction documents, and construction administration services for the support of new cooling towers, chillers, pumps, and associated piping.

Johns Hopkins University South Chiller Plant Addition and Renovation, Baltimore, Maryland
Structural Engineer for the design of a two-story, 11,000 SF concrete frame plant addition and design of structural modifications to the two-story, 36,000 SF plant to support new MEP equipment. The plant addition was designed to house a new main electrical room at the lower level, two–100,000 chillers and associated pumps at the first floor, and a 175,000 pound 4-double cell cooling tower on the roof. Renovations to the existing plant included structural reinforcing of the floor and roof structure to support new equipment and piping. Structural permit and bid drawings were prepared and construction administration services were provided.

Johns Hopkins Hospital Chilled Water Feed Pipe Supports, Baltimore, Maryland
Structural Engineer for the inspection of a section of the existing Meyer Building to determine a method of support for chilled water pipes and to develop structural modifications as needed. Construction drawings were prepared for the modifications and construction administration services were provided.

Springfield Hospital Center HVAC Replacement, Sykesville, Maryland
Structural Engineer for analysis of existing room framing for replacement HVAC units; design of new equipment pads for chillers, boilers, and pumps; preparation of structural drawings; and construction administration services.

EDUCATION

Bachelor of Architecture
University of Tennessee
Knoxville, 1982

REGISTRATION/ CERTIFICATION

Registered Professional Engineer –

Maryland #14479

Virginia #0402016430

Pennsylvania #PE-036041R

EMPLOYMENT HISTORY

Total Years: 45 years;

AEI EXPERIENCE

AEI provides optimization, design, construction administration, commissioning, and start-up services for chilled water plants, heating plants, electrical generation, and combined heat and power systems. We have completed over 500 utility master plans and design efforts. This experience reflects AEI's unique ability to identify solutions that best meet the specific needs of our clients. We consider differences in energy economics, client knowledge and skill, capital constraints, site challenges, reliability and fuel flexibility goals, energy contracting ability, electric utility interconnection rules and regulations, parasitic loads, equipment availability, environmental issues and other project-specific drivers and constraints. Simply put, the planning, evaluation, design, commissioning, and start-up of energy and utility systems are among AEI's core strengths.

CLIENT	COOLING	HEATING	GENERATION
Stanford University	28,000 Tons	360,000 PPH	2,000 KW
Johns Hopkins University Homewood	14,000 Tons	120,000 PPH	5,000 KW
The University of Texas at Galveston	14,200 Tons	150,000 PPH	17,000 KW
Virginia Polytechnic Institute and State University	15,000 Tons	440,000 PPH	10,000 KW
George Washington University	16,000 Tons	40,000 PPH	5,000 KW
University of Virginia	20,000 Tons	400,000 PPH	4,000 KW
University of North Carolina at Chapel Hill	57,600 Tons	500,000 PPH	32,000 KW
N.C. State University, Centennial Campus	24,000 Tons	320,000 PPH	6,000 KW
The Pennsylvania State University	25,400 Tons	655,000 PPH	12,000 KW
NASA Johnson Space Center	14,000 Tons	200,000 PPH	15,000 KW
Houston Methodist Hospital	14,800 Tons	170,000 PPH	5,000 KW
University of Delaware	20,000 Tons	200,000 PPH	5,000 KW
Centers for Disease Control and Prevention	21,000 Tons	440,000 PPH	34,000 KW
National Institute of Standards and Technology	22,000 Tons	320,000 PPH	7,500 KW
US Department of Homeland Security	22,000 Tons	200,000 PPH	35,000 KW
Michigan State University	37,000 Tons	1,315,000 PPH	99,000 KW
University of Illinois at Urbana-Champaign	42,000 Tons	850,500 PPH	84,000 KW
Architect of the Capitol	48,000 Tons	660,000 PPH	45,000 KW
Johns Hopkins Hospital	53,000 Tons	550,000 PPH	27,000 KW
National Institutes of Health	60,000 Tons	800,000 PPH	22,000 KW

University of Pittsburgh

Comprehensive Energy Master Plan and Energy Conservation Plan

Pittsburgh, Pennsylvania

The University of Pittsburgh's 2017 Comprehensive Energy Master Plan and Energy Conservation Plan is an energy and utility systems roadmap for its Oakland Campus for the next three decades. Each investment proposed in this plan was considered not only for the reliability and capacity it offers, but cost and the extent to which it reduces energy, water use and greenhouse gas emissions.

The plan describes campus energy and utilities infrastructure conditions and service capacities for cooling, heating, electric, water supply, wastewater collection and stormwater management. The compromised condition and high utility rates for the city's water and sewer utilities burden the university. The municipal systems, its utility rates and rate projections are detailed in the plan to document the current impact on university capital and operations and serve as the basis for the university's long-term water infrastructure investments.

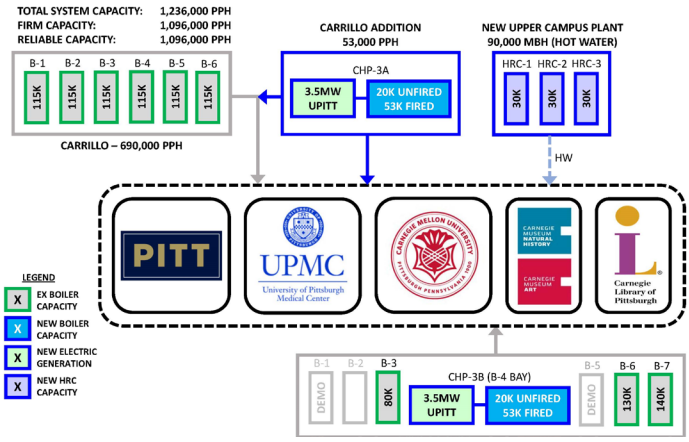
Recommendations are made for capital investments to support existing and future infrastructure needs. This includes testing the university's vision of a campus microgrid by recommending construction at a district scale within the larger campus. This pilot project will integrate rooftop solar, back-up generation and prepare for future microgrid deployment at two campus buildings.

The scope of this study included audits of the university's sixteen most energy-intensive buildings which represent approximately 20% of campus building energy consumption. Energy and water savings opportunities, both capital investments and operational enhancements, were identified for these buildings. Associated cost and greenhouse gas emissions savings were modeled. The results were then extrapolated to suggest potential cost and impact across the entire suite of Oakland Campus buildings.

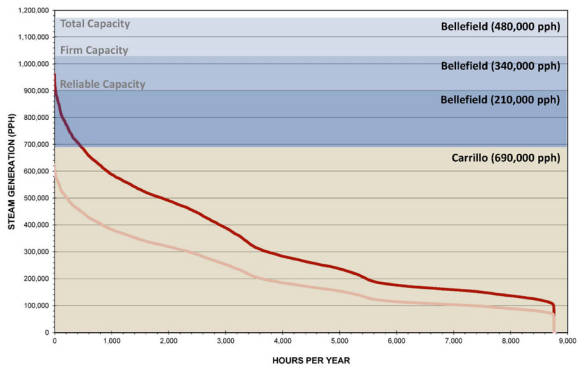
As part of a Utility Master Plan AEI conducted a detailed survey to determine the condition of existing plant equipment/ systems and estimated remaining useful life as well as developed an understanding of the plant operations and dispatch methodology**. AEI evaluated existing equipment, identified potential areas for improvement, and provided recommendations to modernize or upgrade the major equipment** in the Central Plant.

Several recommendations were provided from the condition assessment including the following:

- Install feedwater recirculation piping on economizers back to deaerators
- Replace butterfly valves with gate valves on steam piping
- Remove and redesign continuous blowdown flash tank and heat exchanger assembly
- Replace existing neutralization tank
- Replace carbon steel condensate treatment and handling receivers with stainless steel tanks.



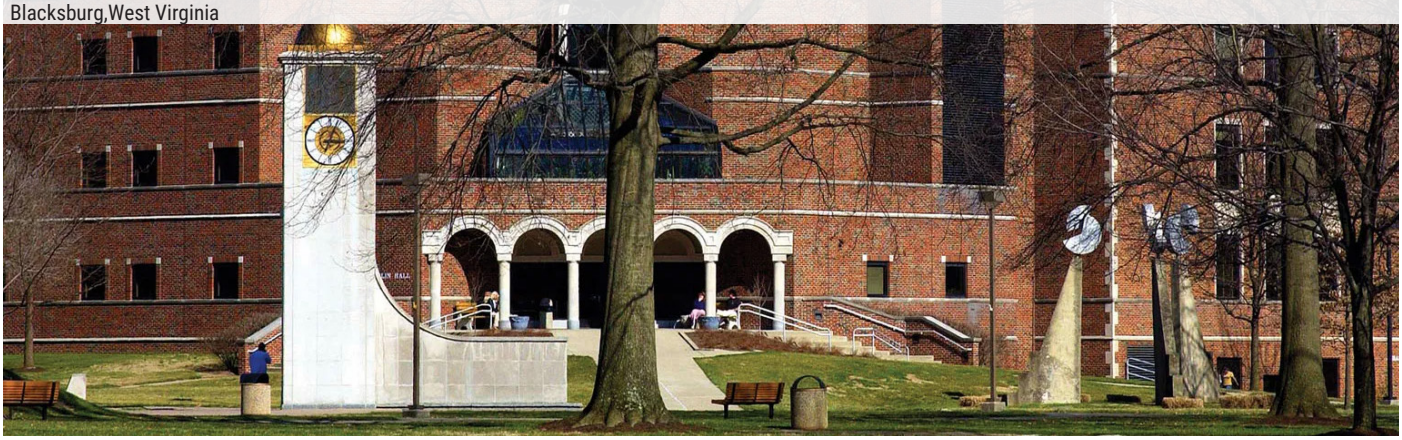
Future Load Duration Curve: 30-Year Growth



West Virginia University

Energy Master Plan

Blacksburg,West Virginia



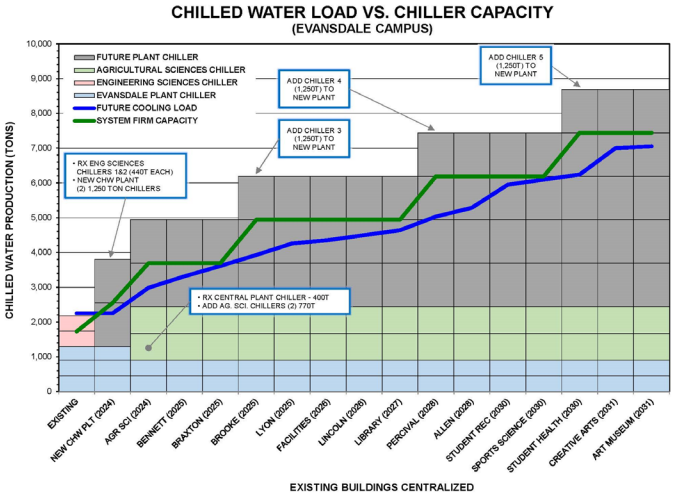
To address the West Virginia University's (WVU) economic and sustainability goals as well as plan for future expansion, an Energy and Utility Master Plan was initiated. The plan included a comprehensive evaluation of the chilled water and steam utility systems including a condition assessment of the chilled water generation assets, an audit of building energy use and a detailed life cycle cost study of the campus third party supplied steam service.

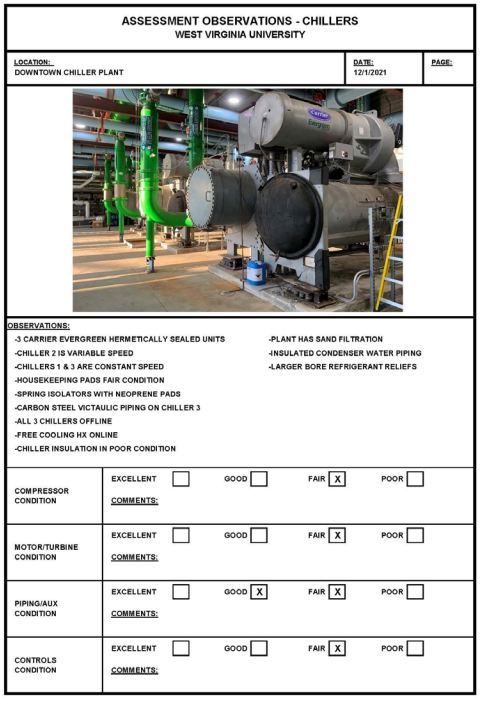
The University located in Morgantown, West Virginia includes two primary campuses (Evansdale and Downtown). The generation of chilled water for both campuses consist of individual building chillers as well as several independent district chilled water plants serving multiple buildings. The steam for the campuses is generated by a third party owned central plant and distribution system.

AEI developed a detailed phasing plan to interconnect the campus independent chilled water generation systems to a centralized system. The resulting system includes a reduction in equipment with an increased total capacity with full redundancy. The recommended plan offsets capital expenditure by integrating buildings into the central system when the existing generation equipment reaches the end of its useful life.

The scope of this study included audits of the University's most energy-intensive buildings which represent approximately 20% of campus building energy consumption. **Energy and water savings opportunities, both capital investments and operational enhancements, were identified for these buildings.** Associated cost and greenhouse gas emissions savings were modeled. The results were then extrapolated to suggest potential cost and impact across both the Evansdale and Downtown Campus buildings.

As part of a Utility Master Plan AEI also conducted a detailed survey to determine the condition of existing chilled water plant equipment/systems and estimated remaining useful life as well as developed an understanding of the plant operations and dispatch methodology. **AEI evaluated existing equipment, identified potential areas for improvement, and provided recommendations to modernize or upgrade the major equipment.**





ASSESSMENT OBSERVATIONS - CHILLERS
WEST VIRGINIA UNIVERSITY

LOCATION:	DATE:	PAGE:
DOWNTOWN CHILLER PLANT	12/1/2021	

OBSERVATIONS:

-3 CARRIER EVERGREEN HERMETICALLY SEALED UNITS
-CHILLER 2 IS VARIABLE SPEED
-CHILLERS 1 & 3 ARE CONSTANT SPEED
-HOUSEKEEPING PADS FAIR CONDITION
-SPRING ISOLATORS WITH NEOPRENE PADS
-CARBON STEEL VICTAULIC PIPING ON CHILLER 3
-ALL 3 CHILLERS OFFLINE
-FREE COOLING HX ONLINE
-CHILLER INSULATION IN POOR CONDITION
-PLANT HAS SAND FILTRATION
-INSULATED CONDENSER WATER PIPING
-LARGER BORE REFRIGERANT RELIEFS

COMPRESSOR CONDITION	EXCELLENT ☐	GOOD ☐	FAIR ☒	POOR ☐	COMMENTS:
MOTOR/TURBINE CONDITION	EXCELLENT ☐	GOOD ☐	FAIR ☒	POOR ☐	COMMENTS:
PIPING/AUX CONDITION	EXCELLENT ☐	GOOD ☒	FAIR ☒	POOR ☐	COMMENTS:
CONTROLS CONDITION	EXCELLENT ☐	GOOD ☐	FAIR ☒	POOR ☐	COMMENTS:

The Johns Hopkins Hospital

Utility Master Plan

Baltimore, Maryland

AEI has provided continuous utility master planning and infrastructure consulting to the Johns Hopkins Medical Institutions for the past 35 years. These services have included four formal utility master plans in addition to biannual updates. The generation and distribution systems include chilled water, steam, 15kV electric, emergency power, telecommunications, and domestic water.

The existing steam plant has been modernized with the recase/retube of 400,000 pph steam boilers, a new plant control system, a second deaerator, a new chemical treatment system, and also numerous energy conserving opportunities including economizers and blowdown heat recovery.

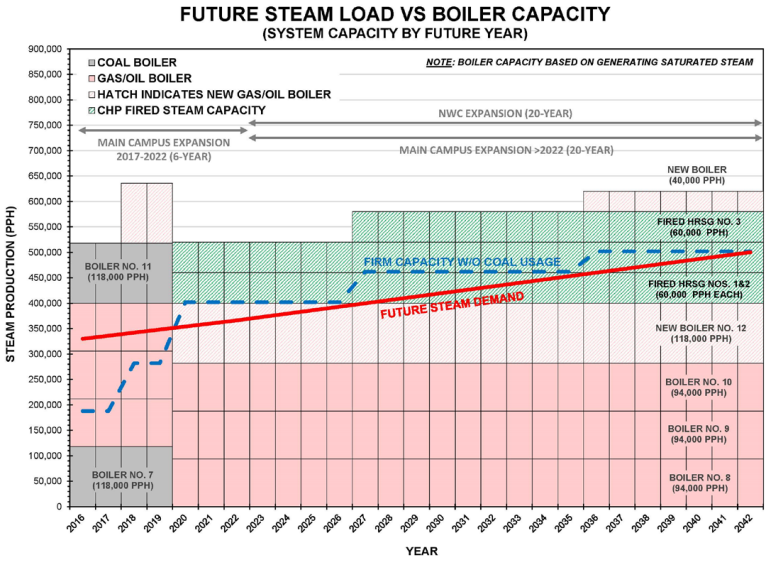
A condition assessment of the central steam plant was completed and included an evaluation of the existing boilers, deaerator, feedwater system, condensate return, chemical treatment, controls and make-up water systems.

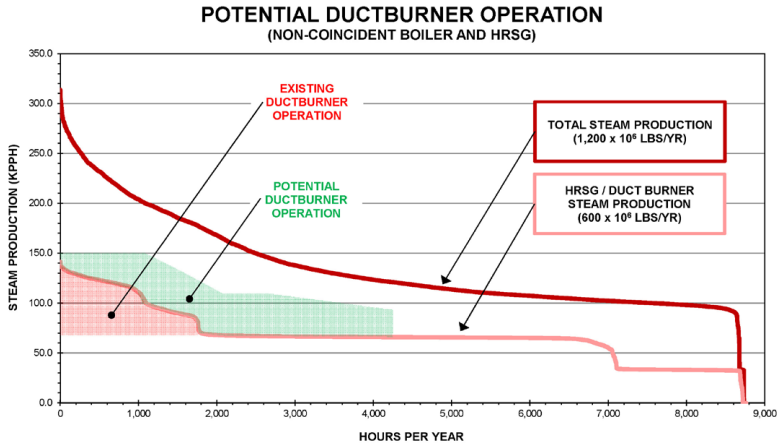
A hydraulic model of the campus steam and chilled water systems has been developed. The model was developed utilizing existing building peak flows and calibrated with pressure readings. The results for the model include pipe velocity and pressure losses as well as identifying choke points in the system.

Two combined heat and power plants each with 7.5 MW capacity supply the campus infrastructure systems. Additionally, the potable water system has been modeled with many modifications to ensure reliability of this critical utility.

The expansion of the chilled water system from 18,000 to 50,000 tons as well as conversion to primary/secondary pumping, was implemented by AEI.

The original campus electric service was a radial feed from a single utility substation. The new 100 MVA electric service consists of multiple feeds from multiple utility company substations. The new emergency power system for the campus consists of two generating plants with approximately 18 MW of centralized emergency power.





Architect of the Capitol

Refrigeration Plant Revitalization

Washington, D.C.

AEI was selected to provide design and commissioning services for a phased, multiyear revitalization of a 42,000 ton Refrigeration Plant in Washington, DC. The plant is the sole provider of chilled water to the client's seven million square foot building complex.

The goal of the revitalization is to provide a comprehensive infrastructure upgrade and modernization of the Refrigeration Plant and its systems without interrupting the facility's ability to produce chilled water. The revitalization will reduce energy use, increase adaptability and flexibility, integrate technology and enhance safety and security.

The Refrigeration Plant consists of two adjoined buildings. The original plant was constructed in the late 1960's and the expansion plant constructed in the mid 2000's.

The original plant had a capacity of 24,000 tons, consisting of four 6,000 ton constant speed medium volt chillers that had reached the end of their useful life and were in need of replacement. The expansion plant had a capacity of 16,600 tons, consisting of three 5,400 ton constant speed medium volt chillers. The original pumping strategy of the plant was a primary-secondary system with the secondary pumps being located in the expansion plant.

It was determined during the concept and budget portion of the project that:

Variable speed chillers provided significant energy savings over constant speed chillers and would be the basis of design. The existing secondary chilled water pumps were reconfigured in a variable-primary pumping arrangement for further energy and floor space savings. A second "pod" of secondary chilled water pumps would be provided in the original plant to increase reliability.

There will be three large phases of implementation to revitalize the Refrigeration Plant due to budget and cash flow restraints. **The total cooling tower and chilled water capacity in the Refrigeration Plant will be approximately 42,000 tons, with provisions for an ultimate capacity of 52,000 tons.**

The original plant will contain 15,000 tons of capacity and the expansion plant will contain approximately 27,000 tons of capacity.

Each plant has been designed for 5,000 more tons of future capacity. The final configuration of the Refrigeration Plant will be two individual plants (original and expansion) that can also operate in unison as one plant through strategically placed valves and piping.

University of North Carolina at Chapel Hill

East Chiller Plant Expansion

Chapel Hill, North Carolina

At the start of this project, the University of North Carolina at Chapel Hill campus had a chilled water capacity shortage. AEI was tasked with expanding the existing East Chiller Plant (ECP) and connecting it to the main campus loop. The plant was originally designed as a stand-alone plant serving only the Smith Center and adjacent Koury Natatorium. Sized to primarily accommodate major events, a large amount of the chiller capacity remained unused a majority of the time. AEI faced a major distribution piping obstacle from a fire-lane campus thoroughfare that separated the East Plant from the rest of the campus loop. In addition, the University required that there be no major disruption of the campus while construction was in progress.

AEI worked with the University to design an interconnected system that solved the capacity problems. By connecting and operating two of the three existing plants in a fixed output mode and allowing the third to vary its output, the system was able to react to changes in needs during peak daytime hours The interconnection of this plant to the campus loop allows for full utilization of the installed capacity. Utilizing jack and bore tunneling under the six-lane thoroughfare (Manning Drive), AEI avoided major disruptions to the campus. **AEI's final project design increased the ECP capacity from 1,650 tons to 2,600 tons.**

Other design components recommended by AEI included:

- Addition of a 1,000 ton crossflow cooling tower
- **Replacement of the existing distribution pumps with two 5,500 GPM variable frequency drives for speed control**
- Installation of 5,000 LF of 24" underground chilled water piping
- Installation of a 1,200-ton electric screw compressor chiller sized for future duty for charging a planned thermal storage system
- Connection to the existing campus 12.47 kV electrical distribution system

University of Virginia

Newcomb Road Chilled Water Plant

Charlottesville, Virginia

AEI was selected to lead the design team for a new chiller plant to serve Alderman Library, Clemons Library and Newcomb Hall at the University of Virginia. The existing regional chilled water system had reached the end of its useful life and needed to be replaced. The system had 2,200 tons of total capacity and 1,500 tons of firm capacity. It was comprised of five chillers with a variety of ages, refrigerants and capacities located in three buildings and piped together to form one of UVA's several regional chilled water loops.

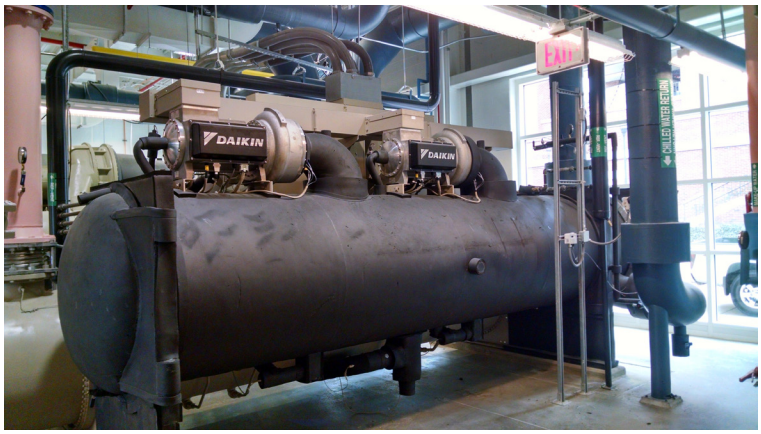
Prior to starting the design process, AEI completed a supplementary study to determine the appropriate capacity, technologies, and configuration for the plant equipment and systems, and to develop acceptable siting and massing options for the plant in this aesthetically sensitive area of the UVA Grounds. The following strategies were specifically evaluated for the new plant:

- Variable frequency driven chillers
- Interconnection of the Newcomb Road Chilled Water Loop to adjacent regional loops
- Free cooling
- Heat recovery chillers
- Thermal energy storage
- Rainwater harvesting and reuse

The new Newcomb Road Chiller Plant (NRCP) building will include a one story, 8,345 square foot **plant designed for an initial capacity of 3,600 tons with 2,400 tons of capacity produced by electric variable frequency driven centrifugal chillers being installed with this project.** The NRCP facility and systems are designed with provisions for a future expansion to an ultimate capacity of 6,000 tons.

The NRCP equipment was designed with the chillers and pumps on the ground floor, plant HVAC and other supporting equipment on an upper equipment platform, and the cooling towers on the roof behind an architectural screen wall. The new NRCP's chilled water system will be extended and connected to different portions of the existing distribution system.

Also, as part of the project, the Newcomb Road Chilled Water Loop was interconnected by several hundred feet of new underground chilled water piping to the existing Central Grounds Chilled Water Loop to allow for greater redundancy, reliability and operational flexibility and efficiency of these two loops.



Johns Hopkins University

South Plant Chiller Upgrades

Baltimore, Maryland

AEI has provided multiple utility master plans for Johns Hopkins University, updating the analyses approximately every five years to address changes in campus growth. The master plans have included economic evaluations of the campus chilled water, steam, hot water, and electrical utility systems. Generation systems have been optimized for redundancy and reliability to meet the campus future load requirements. The final document included multiple recommendations with budgetary pricing.

A recent master plan included recommendations to upgrade the South Plant chilled water generation system and associated electrical distribution. **A subsequent design project included the replacement of Chiller Nos. 1 and 2 in the South Plant with 2,000 Ton units. Associated chilled water and condenser water pumps as well as a new four cell cooling tower were installed as well.**

The new cooling towers are induced draft counter flow design. With the location adjacent to the recently constructed student center, an architectural screening wall was erected around the towers.

The plant electrical system was upgraded to replace equipment beyond its useful life, add capacity to support the increased mechanical loads, consolidate the low voltage electrical equipment, and add redundancy to the low voltage electrical system. The majority of the new electrical equipment was installed in a new electric room in the building addition. At the medium voltage level, two existing 4.16 kV switchgears and associated transformers were replaced. At the low voltage level, three single-ended low voltage switchgears were replaced with one new doubleended switchgear lineup adding N+1 redundancy to the low voltage system. Various downstream motor control centers and panels were also replaced as necessary.

AEI provided mechanical and electrical engineering services and managed architectural, structural and civil sub-consultants. Construction administration, start-up and commissioning services were also provided

Johns Hopkins Hospital

North Energy Plant Chilled Water System Upgrade

Blacksburg, Virginia

The Johns Hopkins Health Institutions are served by two interconnected energy plants that were planned, designed and commissioned by Affiliated Engineers (AEI). For over 25 years, AEI has provided continuous engineering services in support of the most significant infrastructure modernization projects constructed at the Johns Hopkins' campus.

This contract included a multi-year project to replace/upgrade a significant portion of the Johns Hopkins Hospital North Energy Plant chilled water equipment. **The overall project replaces six 1,430 ton chillers with seven 2,800 ton chillers inclusive of piping, pumping, and cooling towers. Significant upgrades to the plant electrical distribution were also performed.** The project was divided into three phases. The first phase included the installation of three 2,800 ton chillers, the second phase included three additional 2,800 ton units, and Phase 3 consisted of the final chiller replacement with two 2,800 ton units.

The cooling towers were custom field erected towers on the roof of the plant. The towers were installed prior to the chillers under Phase1 due to the condition of the existing towers and constructibility phasing of the project.

AEI was the prime engineer of record on this traditional design-bid-build project. AEI performed mechanical and electrical design, project management of architectural and structural sub-consultants, bid assistance, construction administration, commissioning and start-up assistance.

PROJECT APPROACH

Our project understanding is based on the Request for Proposal (RFP) dated May 14, 2025. The following summarizes our understanding of the overall goals of this important project. The project includes two independent designs as described below:

1. Evaluate the existing hot water system supplying the RTI hotel, identify the cause of reported distribution issues, and provide a subsequent design of the recommended solution.
2. Provide a design for the replacement of the existing chillers serving the RTI facility. New chillers will also support elements of the West Virginia Army National Guard Command.

SYSTEM EVALUATION (Project No. 1 - Hot Water Repairs)

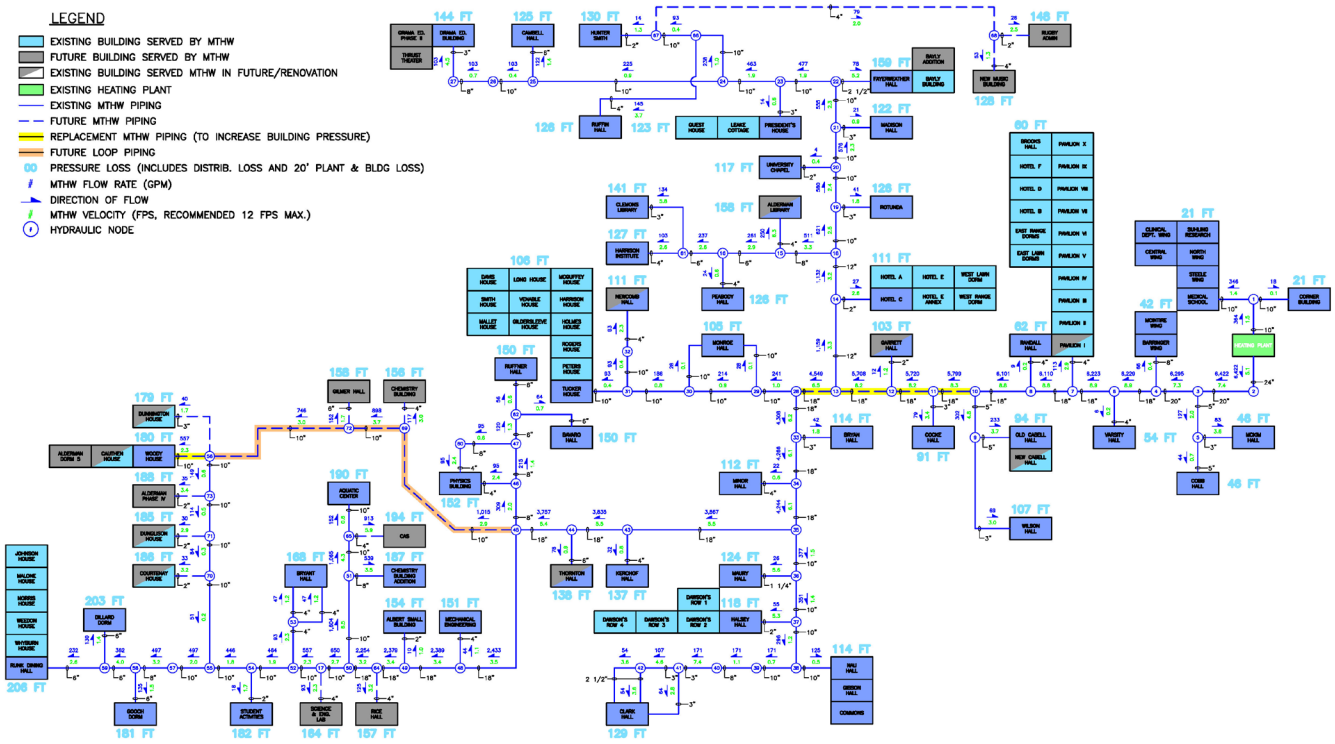
The first part of the design project consists of an evaluation of the existing hot water system. AEI's approach to the evaluation process involves early identification of key issues/decisions that are important for the advancement of the assessment. Interviews with maintenance staff, plant operators and key stakeholders are a priority to understanding the goals of the project.

Options will be developed and analyzed and then presented to the State of West Virginia for review. We have found the best method for identifying potential solutions for analysis involves a series of joint "brainstorming" sessions with key AEI team and owner representatives to ensure a blend of our experience with user preferences.

We believe this type of interactive decision-making allows the State of West Virginia to take advantage of our proposed team's experience and integrating West Virginia's input and preferences. Our goal is to reach decisions that best suit the specific needs of the RTI hotel and facility.

The AEI field personnel for this effort have a unique skill set with a Merchant Marine Officer background and being licensed boiler operators.

Hydraulic modeling will be an integral part to evaluating the distribution system and potential upgrades. Developing a model for an open system such as domestic hot water will require understanding of system elevations, flow requirements, pipe sizes, lengths and system pressures. The output of the model will indicate piping velocity and nodal pressures as well as identify system "choke points", undersized piping locations and other limitations. A sample hydraulic model diagram is on the following page.



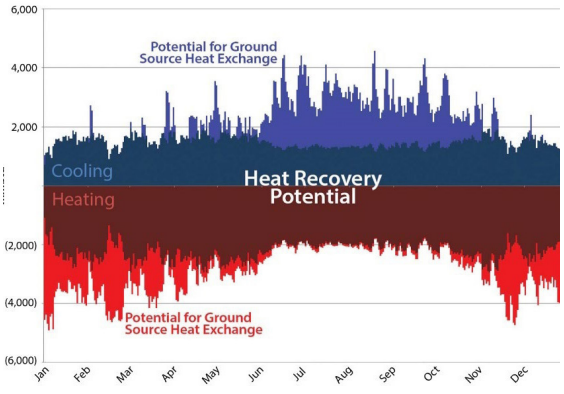
SYSTEM EVALUATION (Project No. 2 - Chiller Replacement)

The second part of the design project will include an evaluation of the system capacity requirements, efficiency upgrades, space constraints, etc. to determine the optimum chiller replacement.

AEI will evaluate existing load metering data and future additions to accurately project the chilled water load growth of the facility. AEI has vast benchmarking data at our disposal relative to utility demands for various functional spaces and uses for new as well as renovated facilities. With input from the State of West Virginia, we will prepare load projection tables.

As mentioned, AEI approaches planning through an interactive process with WV personnel and our team. The goal is to "cover all the bases" and ensure thorough investigation of all potential options and the total effect of each system with respect to other connected interdependent systems. The options will focus primarily on reliability, sustainability and cost effectiveness.

One potential option is the incorporation of Heat Recovery Chillers (HRC). With a significant hot water load requirement associated with a hotel, HRC's can be an energy efficient, sustainable and cost effective approach to simultaneously generate chilled water and hot water. A key to sizing HRC capacity is analyzing both the peak and annual chilled water and hot water loads of the system. Oversizing the system can lead to operational limitations due to low hot water loads in the summer or low chilled water loads in the winter. On the other hand, a significant overlap of the simultaneous energy usage will increase the cost effectiveness and decrease greenhouse gas emissions of the system.



The feasibility study will include recommended equipment test fit and layout of the HRC's within the proposed new central plant. As part of assessing the feasibility, AEI will identify with the the State of West Virginia's system performance metrics (energy or carbon use impact) or cost metrics that are necessary to move forward with a decision on implementation of the proposed alternative.

The work effort developed will be assembled into a final reportdocument including an executive summary, system analysis, recommendations, and an appendix of all materials developed to date. Draft copies will be distributed to the State of West Virginia for review. Comments will be gathered, responded to and incorporated into the final assessment document.

Once a detailed solution has been identified, design documents will be developed for contractor implementation.

PROJECT MANAGEMENT

Objectives are achieved through detailed planning, administration and control, and effective coordination. At the heart of our project organization plan is the "Project Team". Qualified personnel are assigned to address complete project needs. The areas of required expertise are integrated and the engagement is effectively planned, organized, directed, coordinated, and controlled. AEI's Project Team provides a project-specific organizational structure, which enhances communication, coordination, and the effective utilization of personnel needed to successfully complete the project.

The purpose of this structure is to facilitate the preparation of accurate and complete, high-quality drawings, calculations, and related documents prepared specifically to meet the scope of work and budget of this project by establishing and implementing procedures, responsibilities, and relationships for members of the Project Team. The execution of the standards by the Project Team will provide a professional product that is understandable, reliable, technically complete, and in compliance with the client's standards and regulatory constraints, while at the same time adhering to our profession's standard of care.

AEI has assembled a team which shares a commitment to innovative approaches to utility production and distribution along with deep experience gained from years of service to facilities similar to the RTI. Our strategic partnership combines the best resources, talent, and expertise of each firm to deliver the most impactful solutions. That is why we have selected Paradigm Architecture (Architect), Columbia Engineering (Structural Engineering), and RIB U.S. Cost (Cost Estimating) for the Camp Dawson RTI Hot Water Repairs and Chiller Replacement project. We are excited to combine AEI's national resume of utility plant design experience with these partners.

DESIGN PHILOSOPHY

It is our design philosophy to recognize and work with our clients' staff to utilize the knowledge they have concerning their facilities. We are sensitive to what they wish to accomplish and how they hope to accomplish it. We will contribute suggestions to spur thinking and to help test basic assumptions. We will suggest alternative technologies where cost and performance opportunities may benefit the project.

AEI understands that the following phases will be required for this project.

- Program Development
- 30% Design Submission
- 60% Design Submission
- 100% Design Submission
- Construction

AEI's design team will complete project construction documents including drawings and specifications.

- At each design submission phase scale drawings with applicable engineering calculations, assumptions, and outlined specifications will be developed. Each phase will address previous comments from the State of West Virginia's staff reviews.
- Design Review. AEI will submit documents electronically to the State of West Virginia. AEI will be available to present documents if requested. Written comments from the State of West Virginia's project manager should be expected within two to three weeks from the date of the delivery of the submission documents.
- AEI will respond, in writing, to each of the comments that have been included in the Project Manager's written comments summary and will attend design review meetings to discuss and close out all comments.
- Each design submission will include a revised cost estimate and updated schedule.

Construction Administration (CA) will also be performed under the project. Our CA services include submittal review, RFI responses, construction meeting attendance and progress review, as-built documentation from contractor red-lines, and project closeout. Start-up and commissioning services can also be provided if requested.

QUALITY CONTROL

AEI has a formalized Document Quality Control Plan (DQCP). The DQCP defines specific procedures; defines internal quality control review processes; includes analysis review, interdisciplinary coordination, and peer review checklists; and includes auditing tools as the means of assuring quality of submissions. Key aspects of the DQCP include:

- Development of project-specific quality plans, identifying specific processes and activities that are to be completed during each phase of a project, to ensure a quality product.
- Quiz Bowl sessions conducted for each discipline during the early stages to allow the team to vet and validate the appropriateness of system concepts, engineering, and layout with the senior engineers and designers.
- Use of discipline-specific design checklists. AEI maintains comprehensive lists of items that must be considered as part of system engineering – updated with observations and lessons learned from every completed project, ensuring continued thoroughness and updates to quality improvement.
- Use of interdisciplinary coordination review checklists of items that require coordination between engineering design disciplines. These checklists are completed by the respective discipline project engineers and designers to confirm that engineering items involving multiple disciplines have been coordinated from each discipline's perspective.
- Use of discipline-specific peer review checklists of items to be examined by peer reviewers completing their quality reviews.
- Client review processes included as part of the project quality control process. AEI's practice is to track every client review comment via spreadsheet, documenting a response to each comment, who addressed the comment and when.
- Auditing the execution of the project quality control plan, completed using a DQCP Inventory Summary. This summary tracks the status of the quality processes defined for the project. Project management and leadership monitor the summary to ensure quality processes are completed at the appropriate times.

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) Aaron Wickersham, P.E.

(Address) 200 International Circle, Suite 5888, Hunt Valley, Maryland 21030

(Phone Number) / (Fax Number) 443-281-7027

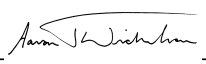
(email address) awickersham@aeieng.com

CERTIFICATION AND SIGNATURE: By signing below, or submitting documentation through *wv*OASIS, 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.

Affiliated Engineers, Inc.

(Company)



(Signature of Authorized Representative)

Aaron Wickersham, P.E.; Principal-in-Charge

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

443-281-7027

(Phone Number) (Fax Number)

awickersham@aeieng.com

(Email Address)