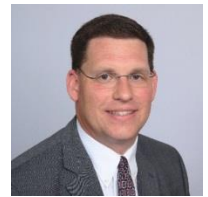




James T. Miller, PE | LEED® BD+C | CSI-CDT

Vice President, Healthcare & SciTech Engineering



Background

Mr. Miller is a Senior Mechanical Engineer and Project Manager with over 25 years of Healthcare, Science & Technology, Academic and large Commercial building project experience. He leads interdisciplinary teams of engineers and designers to provide customized engineering solutions to the most complex and challenging projects. He enjoys getting to know clients and understanding their needs and expectations so appropriate design solutions can be implemented early during project conceptual design phases, but will not hesitate to propose unique and creative, out-of-the-box solutions to ensure client needs are met or exceeded.

Education

Master of Science, Architectural Engineering (MS, Building Energy Systems)
Bachelor of Science, Architectural Engineering (BAE, Environmental Option)
Pennsylvania State University, University Park, PA

Professional Licenses & Certifications

Professional Engineer licensed in New Jersey, Pennsylvania, Ohio

United States Green Building Council (USGBC), LEED® BD+C Accredited Professional

Affiliations

Construction Specifications Institute (CSI), Certified Construction Documents Technologist (CDT)
American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE)

Conferences/Presentations

MED-ED Facilities, "Infrastructure Through PPP Investment in Energy Efficiency", Apr 2016

SCUP Mid-Atlantic, "Integrating Resilience and Flexibility Into an Historic Renovation Project", Apr 2016

ISPE, "HVAC System Optimization", Feb 2011

Select Healthcare Project Experience

- **AtlantiCare, Mainland Emergency Department Pressurization Modifications, Pomona, NJ:** A renovation project in the active Emergency Department of the AtlantiCare Mainland Campus Emergency Department to create four isolation treatment rooms that maintain negative pressure relative to the adjacent spaces. The design entailed modifying the existing patient rooms to be fully exhausted and outfitted with pressure monitoring controls to ensure the rooms remained negatively pressurized.
- **AtlantiCare Mainland / City Campus Core Lab Renovations, Atlantic City & Pomona, NJ:** A renovation project for the Chemistry & Hematology Laboratory Suite at the Mainland and City Campus sites of AtlantiCare Regional Medical Center. The design included new mechanical, electrical and plumbing services for the hospital's new phlebotomy and specimen analysis equipment.
- **AtlantiCare Regional Medical Center (Mainland), Isolation Room Conversion, Pomona, NJ:** Conversion of existing patient room to FGI-compliant Airborne Infection Isolation (AII) room with new dedicated exhaust fan and room controls. Prototype to be implemented throughout hospital for future conversion of rooms to AII.
- **AtlantiCare Regional Medical Center (City), Isolation Room Upgrades, Atlantic City, NJ:** Engineering study of pressurization control problems led to full engineering design for upgrade of existing Airborne Infection Isolation (AII) room central exhaust systems and room controls to compensate for room air leakage (with no anterooms) and achieve dynamic control of room pressurization according to current FGI requirements.
- **AtlantiCare Mainland Meadows Patient Tower Expansions, Pomona, NJ:** An overbuild expansion project to include two new floors of med-surg patient care rooms and a new critical (intensive) care floor. The project includes a new mechanical systems for the entire building addressing infectious disease response resiliency – room pressure controls, enhanced air change rates, 100% OA flexibility and enhanced O2 system. Project

also upgrades to central plants for added resilience, upgrades to bulk O2, and supplemental O2 distribution to entire existing hospital.

- **Brookdale Community College, Central Utility Upgrades, Lincroft, NJ:** Provided commissioning services for the replacement of 3 chillers and 3 boilers plus chilled water condenser water and hot water pumping/distribution systems. The project also includes also modifications to the method used to connect buildings to the central chilled and hot water piping systems to maximize deltaT's and a new substation and emergency generator.
 - **Bristol-Myers Squibb, Child Development Center, New Brunswick, NJ:** This new 17,000 sf day care houses approximately 150 children from infant to school age. The project includes a study of heat recovery options including total energy recovery wheels.
 - **Catholic Health Services of Long Island, Mercy Medical Center, Villas RTU Replacements, Rockville Center, NY:** Prepared calculations and technical requirements for multiple RTU replacements at the Villas building. RTU-1 was originally oversized and could not properly condition the space. As part of the project RTU-1 was properly sized to ensure correct operation and energy savings.
 - **Catholic Health Services of Long Island, Mercy Medical Center, Villas VAV Re-zoning, Rockville Center, NY:** Modified VAV box zoning to improve comfort control in building. Original building and HVAC system was for open office space and very minimal perimeter office, but renovations over many years have added partitions and many perimeter offices but had not modified HVAC air distribution zoning.
 - **Catholic Health Services of Long Island, Mercy Medical Center, OR AHU and Chiller Replacement, Rockville Center, NY:** Replace existing indoor AHU with new outdoor AHU with multiple fans and other high resilience features. Replaced single return fan with parallel, redundant fans. Replaced air-cooled glycol chiller with new, resilient air-cooled chiller. Project designed for no OR downtime.
 - **Catholic Health Services of Long Island, St. Francis Hospital, OR Dehumidification Improvements, Roslyn, NY:** Inadequate summer dehumidification due to poor central plant chilled water delivery and inadequately sized supplemental chiller and cooling coils in air-handers was supplemented by desiccant dehumidification of minimum outdoor air to provide trim dehumidification seasonally, as required to comfort and infection control.
 - **CentraState Medical Center, Freehold, NJ:** A New Jersey Natural Gas engineering solutions project to upgrade the existing mechanical and electrical systems to optimize the facility's operation and maximize their overall energy efficiency. The project included air handling unit upgrades, water-cooled chiller upgrades, cooling tower replacements, steam trap replacements, piping insulation upgrades, LED lighting upgrades and electrical transformer replacements.
 - **Children's Specialized Hospital, Outpatient Clinic/Daycare Center, Roselle Park, NJ:** This new 8,500 sf children's outpatient clinic/daycare center involved the design of multiple constant volume rooftop air handling systems, new electrical, plumbing and fire protection systems. The design of these systems was performed on a fast track basis in order to expedite the approval processes allowing the building to be occupied in a timely manner.
 - **Chilton Medical Center, Emergency Department Phase 2, Pompton Plains, NJ:** Renovation and expansion of existing emergency department. Project was phased to
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allow for active emergency department. Projected include renovations to existing emergency department and hospital space and included exam and treatment rooms, isolation rooms, patient rooms, and support spaces.

- **Chilton Medical Center, Health Pavilion, General Surgery Timeshare, Pompton Plains, NJ:** Fit-out within existing outpatient medical building as shared physician practice space. Project included new rooftop AHU to serve new and future tenant space.
 - **Chilton Medical Center, New Security Center, Pompton Plains, NJ:** Added new security office in ED and extended all security, life safety and duress monitoring systems to this central location for constant supervision.
 - **Chilton Medical Center, MRI Replacement, Pompton Plains, NJ:** Replaced existing MRI with new machine and renovated MRI suite, including upgrading MEP systems, to meet new workflow and healthcare best practices.
 - **Chilton Medical Center, Pharmacy Renovation, Pompton Plains, NJ:** Phased renovation of existing in-patient pharmacy including new USP-800/797 compliant cleanroom suite with hazardous and clean sterile compounding labs. New dedicated air-handling system maintains cold lab space temperatures and dehumidifies to ensure comfort. New emergency generator dedicated to Pharmacy and associated HVAC systems.
 - **Cooper University Hospital, OR Dehumidification and Back-up Chillers, Camden, NJ:** Provide desiccant dehumidification system to ultra-dry outdoor air for humidity control in main surgery operating rooms. Provide new chillers as back-up for existing chillers serving main OR and ambulatory surgery center withing hospital.
 - **Cooper University Hospital, K-6 Special Test Fellowes Work Room, Camden, NJ:** Renovate existing Manometry Room into new office/conference space for 6 fellowes and then renovate prior office into new Manometry Work Room.
 - **Cooper University Hospital, PSE&G IGA Energy Audit, Camden, NJ:** Provide comprehensive level 3 energy audit for 1.1 million sf of inpatient, clinical support and outpatient care buildings on center-city campus.
 - **The Cleveland Clinic Foundation, OR Airflow Study, Cleveland, OH:** Diagnosed and proposed solution for an inadequate air flow problem from a new VAV air handling system serving 12 new operating rooms.
 - **Firmenich, Building K, Flavors and Fragrances Manufacturing Plant Expansion, Plainsboro, NJ:** Mechanical, electrical and plumbing master plan and design services were provided for the 75,000 sf manufacturing plant expansion. Linked to their existing plant and administrative offices, the expansion included separate flavor and fragrance manufacturing buildings, compounding areas, loading docks, drum and hazardous material storage and quality control laboratories. A high bay automatic storage and retrieval system (ASRS) facility was also included as well as office space, lockers, shower facility and cafeteria.
 - **Firmenich, Building N, Fragrances, Plainsboro, NJ:** A new four-story 125,000 sf development and testing laboratory facility for fragrances including a hair salon, laundry test facility, evaluation chambers and aerosol laboratory.
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- **Hackensack Meridian Health, Hackensack University Medical Center 2nd Street Tower Addition and New Central Utility Plant, Hackensack, NJ:** New 500,000 sf addition including 24 OR surgical department, new Central Sterile Supply, 200 private in-patient rooms including ICU, med/surg and univernal rooms plus a new central plant building (chilled water, high pressure steam, new campus electric service, emergency power and future Combined Heat and Power plant).
 - **Hackensack University Medical Center, Compounding Pharmacy Peer Review, Hackensack, NJ:** Engineering peer review of new compounding pharmacy for compliance with current design standards and regulatory requirements, including USP 800 Hazardous Compounding. Recommended improvements to ensure pressurization and temperature control.
 - **Hackensack University Medical Center, John Theurer Cancer Center, Infusion Suite Humidification, Hackensack, NJ:** Added space humidification to infusion area to comply with equipment requirements and improve patient comfort.
 - **Hackensack University Medical Center, John Theurer Cancer Center, Central Humidification Replacement, Hackensack, NJ:** Removed existing gas-fired humidifiers and added gas-fired, clean-steam plant for central humidification re-using steam grids in air-handlers.
 - **Hackensack University Medical Center, John Theurer Cancer Center, Pharmacy Renovation, Hackensack, NJ:** Constructed replacement pharmacy, including new USP-800/797 Cleanroom Suite, at new location withing existing Cancer Center including Hazardous and Clean Compounding Labs. New dedicated HVAC systems capable of low space temperature and dehumidification for comfort.
 - **Hackensack University Medical Center, Medical Plaza, Ambulatory Surgery Center HVAC Improvements, Hackensack, NJ:** Various incremental projects to improve OR space conditioning and humidity control, and pressurization including return fan replacement, AHU upgrades, outdoor air systems improvements and controls upgrades.
 - **Hackensack University Medical Center, 2nd Street Tower Addition and New Central Utility Plant Commissioning, Hackensack, NJ:** Enhanced commissioning of systems serving new 500,00 sf hospital addition plus new central steam, chilled water and emergency power plant.
 - **Inspira Medical Center Woodbury, Hospital Expansion, Woodbury, NJ:** The phased 210,000 sf renovation and expansion includes the construction of a new 22,000 sf medical office building and a 100,000 sf garage addition. Renovated and expanded programs include the emergency department, ambulatory surgery, neonatal intensive care unit, MRI suite, central sterile supply suite, physical medicine and rehabilitation, operating room support, 17-bed medical/surgical unit and the CT Scan Department.
 - **Inspira Medical Center Woodbury, Master Plan, Woodbury, NJ:** Master plan for 210,000 sf of additions and renovations to the hospital complex.
 - **James Madison University, Dining Facility, Harrisonburg, VA:** This project is a new 50,000 sf student dining facility with a full kitchen and seating capacity of 750 people. It contains display cooking areas, indoor and outside seating facilities, an executive dining area, associated offices and administrative areas, loading dock and storage facilities, public restrooms, staff locker and shower facilities, and custodial/utility spaces. The project achieved LEED®-NC Gold certification.
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- **Jersey Shore Medical Center, 4th Floor Operating Room #4 Expansion, Neptune, NJ:** An expansion of the room which required the mechanical systems serving the room to be brought up to code. A new roof top air-handling unit was required to supply the increased cooling load and feed an adjacent operating room in the future.
 - **Jersey Shore Medical Center, Various Renovations, Neptune, NJ:** Various renovations including a 20,000 sf Family Health Center, a 12,000 sf renovation of surgical suites and locker areas, and a 13,000 sf renovation of the Neonatal Intensive Care Unit. Renovations of the emergency department, ambulatory pharmacy, clean bulk storage area, and ob/gyn and medical records areas were also included in this project.
 - **Joseph Brant Hospital, Redevelopment, New Patient Tower, Toronto, Canada:** A new 450,000 sf addition including: 65,000 sf surgical department with 11 ORs, bronch/cysto/endo procedure rooms, PACU and recovery areas and surgical staff support suite with lockers, showers and on-call; 144 new med-surg private patient rooms; new 38 bed ICU plus shell for future; new in-patient pharmacy with USP 797 suites, new clinical lab department; emergency department with satellite diagnostic imaging, new ambulatory care clinics, and new central utility plant with heat recovery chiller, high pressure, low-mass steam boilers and low-temperature condensing boilers for space and domestic water heating and 3,750 kW of emergency power generation.
 - **Kent State University Health and Wellness Center, Kent, OH:** New recreation and wellness center for university including natatorium dehumidification/heating/cooling system, atrium smoke control system, heat recovery systems, chilled water plant, hot water boiler, and a study of gas-fired cooling versus electric.
 - **King Abdullah University of Science and Technology (KAUST), Engineering Science Building, Rebih, Saudi Arabia:** The Engineering Science Hall houses classrooms that include modular laboratories, multi-media, interactive classrooms and lecture rooms, and the offices for the Dean of Faculty. Sustainable design features include high-performance glazing, air handling units with total energy recovery wheels, chilled beams, and photocell control and daylight harvesting systems. The project achieved campus wide LEED®-NC Platinum certification.
 - **Lancaster General Health, Operating Room Air Handling Unit Replacement, Lancaster, PA:** An air handling unit replacement and supplemental chilled water system design for an Operating Room Suite at the Lancaster General Health Suburban Outpatient Pavilion. The replacement air handling system was engineered to minimize the disruption to the Suite's operation by utilizing a phasing implementation plan that allowed the new unit to be installed while the existing unit remained in place and operational. The supplemental chilled water system provided redundancy for the critical Operating Room Suite.
 - **Longwood University, Bedford Hall, Farmville, VA:** This 75,000 sf renovation and expansion of the existing fine arts includes painting and sculpture studios along with photography, ceramic and mixed media spaces. The MEP infrastructure for the project is all new and includes a new remote chiller plant. The building is designed for LEED®-NC certification.
 - **Monmouth Medical Center, Long Branch, NJ:** A New Jersey Natural Gas engineering solutions project to upgrade the existing mechanical and electrical systems to optimize the facility's operation and maximize their overall energy efficiency. The project included air handling unit upgrades, steam trap replacements, LED lighting upgrades and electrical transformer replacements.
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- **Montclair State University, CELS Vivarium Modifications Study, Montclair, NJ:** An in-depth feasibility study that evaluated the current mechanical systems serving the vivarium at the University's Center for Environmental and Life Sciences (CELS) facility. Under this study, the modification requirements for the mechanical systems were evaluated and three plausible options were detailed that would bring the vivarium in compliance with the current AAALAC requirements. The three options were schematically priced for the University's use in developing a project budget.
 - **Montclair State University, University Hall, Montclair, NJ:** A new 7-story, 265,000 sf academic building houses classroom space, faculty offices, a conference center, a lecture hall, the campus information technology center, a library and teaching labs. This building achieved LEED®-NC certification and features lighting controls, low e-glass, premium efficiency motors with variable frequency drives, and a highly efficient cooling system with 0.36 NPLV chillers.
 - **Montclair State University, The Center for Environmental and Life Sciences (CELS), Montclair, NJ:** The new 5-story, 107,500 sf laboratory building houses research and teaching labs, acid digestion cleanroom lab, a vivarium, lecture hall, multi-purpose atrium, faculty and College of Science and Mathematics administrative offices. This building is designed for LEED®-NC Silver certification.
 - **Morristown Medical Center, Critical AHU Replacements and Energy Efficiency Upgrades, PSE&G Hospital Efficiency Program, Morristown, NJ:** Replacement of seven critical AHUs serving ORs, Emergency Dept, Diagnostic Imaging Dept, Sterile Processing Dept, Inpatient Pharmacy, Multi-purpose room and administrative areas with new headered AHUs to improve energy efficiency and operational reliability. Refurbishment of two AHUs serving cafeteria and kitchen for improved energy efficiency, including retrofitting kitchen hoods exhaust systems with demand-controlled, variable flow.
 - **Morristown Medical Center, East Chiller Plant Energy Efficiency Upgrades, PSE&G Hospital Efficiency Program, Morristown, NJ:** Replacement of two existing centrifugal chillers (1200 and 400 TR) and a steam absorber (700 TR) with two new 1200 ton, variable-speed centrifugal chillers and relocation of an existing 900 TR centrifugal chiller to be "standby". Replaced chilled water pumps and piping, condenser water pumps and piping for variable flow. New plant optimization control to optimize total plant efficiency – chillers, cooling tower, and pumps.
 - **Morristown Medical Center, Emergency Power Upgrades, Morristown, NJ:** Comprehensive study and design of emergency power systems serving central heating and cooling plant and critical air handling systems throughout the 1.3M sq. ft. facility. Upgrades include addition of a 2.5MW diesel generator to pick up primarily chilled water plant, but also to add additional AHUs to emergency power.
 - **Morristown Medical Center, Steam Boiler Plant Energy Efficiency Upgrades, PSE&G Hospital Efficiency Program, Morristown, NJ:** Replacement of one 1200 BHP, high-pressure water-tube steam boiler with new 1200 BHP fire-tube boiler with variable speed blower and stack economizer. Relocated existing 500 BHP fire-tube boiler and upgraded it with new variable speed blower, stack economizer and boiler optimization controls. Upgraded combustion air system to temper incoming air. Existing 1200 BHP water-tube boiler remains in place for 'emergency standby' operation only.
 - **The Mount Sinai Medical Center, Mount Sinai Doctors Faculty Practice at 85th Street, New York, NY:** Renovated an existing 6-story parking garage to create a new 50,000 sf standalone, multi-specialty outpatient center that includes Physical Therapy,
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Ophthalmology, Urgent Care, Primary Care, Obstetrics/Gynecology, Pediatrics, Otolaryngology, and Dermatology. The building required multiple new utility services and all new mechanical, electrical, plumbing, and life safety systems including a natural gas emergency generator. The project also includes provisions for a future Ambulatory Surgery Center on the sixth floor with two Class C operating rooms.

- **The Mount Sinai Medical Center, Guggenheim Pavilion Steam Condensate, New York, NY:** Investigated and corrected steam infrastructure that prevented steam condensate from properly draining from the system. Scope of work included detailed investigation and analysis, design for a new steam condensate pump, and other remedial modifications.
- **Mount Sinai Medical Center, Imaging Suite Humidification, New York, NY:** Analysis and design was performed for properly humidifying an imaging suite. The existing system was not providing proper humidify levels to the space causing equipment imaging issues. New central and trim humidifiers were added to properly serve the space.
- **New York University Langone Medical Center, Psychiatry and Child & Adolescent Psychiatry Consolidation, New York, NY:** Retrofit of two floors of leased space, approximately 66,000 sf, for the co-location of the clinical and research space of two distinct departments. Scope of work includes mechanical, electrical, plumbing and fire protection to accommodate both departments that demand high degrees of visual and acoustic privacy for their clientele, which has a direct relationship to system designs. The programming has a high percentage of perimeter offices, interior offices, shared office and workroom spaces, conference rooms and lounge spaces as well as support and MEP service rooms.
- **Northern Virginia Community College, Tyler Replacement Building, Alexandria, VA:** The Tyler Replacement Academic Building is an 80,000 sf facility which contains a variety of user functions. Primarily an art and music building, it includes a music rehearsal room, teaching studios, a black box theater, sculpture studio, ceramics studio, wood shop and a photography studio. In addition, there is a bookstore/café, exercise and pre-school facility. The building is three stories and will be designed for LEED®-NC Silver certification.
- **Northwell Health, Central Clinical Services Building, Bethpage, NY:** Adaptive reconstruction of a former industrial plant building for use as a large-scale central sterile processing facility and central pharmacy (USP 797 and USP 800 cleanroom compounding suites) distribution for a large health system's multiple hospitals. The original project also included a large ambulance garage addition for centralizing dispatch of emergency vehicles and EMTs throughout the region.
- **Palisades Medical Center, Energy Efficiency Upgrades II, North Bergen, NJ:** Upgraded all interior and exterior lighting and lighting controls to LED, replaced existing 60T rooftop water-source heat pump serving kitchen with new WSHP, added variable-volume, demand-controlled kitchen hood ventilation system (Melink) and replaced motors throughout facility with NEMA Premium efficiency motors under PSE&G Hospital Efficiency Program.
- **Palisades Medical Center, MEP Infrastructure Assessment and Master Plan, North Bergen, NJ:** Comprehensive survey and assessment of major mechanical and electrical systems including: air-handling systems, hydronic systems, central steam plant, central chilled water plant, central medical gas systems, domestic water systems, emergency/normal power, and building automation and control system. Made

recommendations for MEP upgrades to support planned facility master plan.

- **Palisades Medical Center, Repair OR HVAC Deficiencies, North Bergen, NJ:** Study of cooling and dehumidification problems in operating rooms led to emergency upgrades to central air handling unit to meet FGI guidelines including coil upgrade/replacement and modifications to controls. Made recommendations for future improvements to system for better environmental control and resilience.
 - **Palisades Medical Center, Outpatient Rehab Center, North Bergen, NJ:** MEP tenant fit out of shell space to a Physical Therapy and Occupational Therapy suite. Existing central air systems were utilized, and space was designed to meet FGI requirements.
 - **Palisades Medical Center, Cardiac Catheterization Suite and Waiting Area, North Bergen, NJ:** MEP design services for a renovation of an existing waiting area into a Prep/Recover Suite, and an existing mammography suite into a new waiting area.
 - **Penn Presbyterian Medical Center, Emergency Department Renovation, Philadelphia, PA:** A phased renovation of the emergency department and a 1-story in-fill addition.
 - **The Peddie School, The Walter and Leonore Annenberg Science Center, Hightstown, NJ:** This 42,000 sf science building includes teaching labs for chemistry, biology, and physics and incorporates two innovative “Special Projects” rooms, where students explore research topics of their choosing.
 - **Pfizer Building B286 Renovation, Groton, CT:** 10,000 sf renovation to laboratory to accommodate temporary bioprocess and fermentation laboratories. Included in this renovation was a new 100% outside air handling system serving 8 existing rooms (4,000 sf); structural work associated to a new rooftop; and basement freezer placement and electrical hookups.
 - **Princeton House Behavioral Hospital, Addition and Renovations, Princeton, NJ:** A new 25,000 sf, 46-bed inpatient unit addition and approximately 70,000 sf of renovations to the existing facility areas such as outpatient rooms, offices, kitchen and lab spaces.
 - **Princeton University, Jadwin Hall, HVAC Master Plan, Princeton, NJ:** This project included a detailed HVAC Infrastructure Master Plan Study for this 240,000 sf building that houses faculty, staff and student offices, classrooms, a lecture hall, the largest machine shop on campus, and teaching and research laboratories. It resulted in recommendations for numerous HVAC system upgrade projects to dramatically reduce energy costs and renew the building systems for another 30 to 40 year life cycle.
 - **Princeton University, Jadwin Hall, Renovations and Upgrades, Princeton, NJ:** This project includes phased HVAC upgrades for a 240,000 sf building that houses the Physics Department faculty, staff and student offices, classrooms, a lecture hall, the largest machine shop on campus, and teaching and research laboratories. Antiquated HVAC induction air systems were replaced with active chilled beams and radiant panels for the perimeter offices. Dual-duct and multi-zone systems were converted to single-duct VAV. Project also included window replacements, lighting upgrades and life safety upgrades; all while building was occupied and utilized.
 - **Princeton University, McCosh Health Center Study, Princeton, NJ:** The McCosh Health Center was built in 1925, and has undergone multiple renovations over the last 80 years. A study evaluated the current program needs and the condition of the mechanical, electrical, plumbing, and fire protection systems in this 5-story, 60,000 sf
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infirmary/health center. The study also evaluated options of building a new health center elsewhere on campus to accommodate Princeton's plan to increase the size of the undergraduate student body.

- **Princeton University, Center for Theoretical Physics, Princeton, NJ:** This 10,000 sf renovation of the 4th floor of Jadwin Hall into professor's offices, lecture hall, coffee break areas, student study spaces and lounges included replacements and upgrades of the electrical, mechanical and plumbing systems. The antiquated HVAC induction air system was replaced with active chilled beams for the perimeter offices. A new fire protection sprinkler system was added to this portion of the building as the first phase of a comprehensive building fire protection upgrade.
 - **Princeton University, Guyot Hall/Moffett Hall, Ongoing Laboratory Renovations, Princeton, NJ:** More than a dozen laboratory renovations have been provided in the Moffett/Guyot Science Complex for the Geosciences and the Evolutionary Biology Departments along with Princeton Environmental Institute. These projects have varied in size from a single laboratory room to a full floor of a wing and are typically necessary to accommodate new staff appointments or new research grants. All projects were completed while the building remained occupied.
 - **Princeton University, Lewis Thomas Laboratory, HVAC Upgrades, Princeton, NJ:** This project includes NJ Office of Clean Energy, Pay for Performance program upgrades to the existing HVAC systems in a 120,000 sf research and teaching lab building in order to reduce energy usage by more than 20%. Upgrades include variable volume air and water systems, reduced lab air change rates, facility air quality monitoring system for ventilation reset, new DDC controls, and heat recovery modifications.
 - **Princeton University, Schultz, Moffett & Guyot Energy Audits, Princeton, NJ:** Performed ASHRAE Preliminary Energy Analysis, Level 1 Walk-through Analysis and Level 2 Engineering Analysis for 267,600 sf of laboratory, faculty and administrative office space in three connected buildings. Identified Energy Conservation Opportunities, estimated energy savings and implementation costs for each, and recommended Measures best suited to achieve University's financial and sustainability goals.
 - **Riverview Medical Center, NJNG Hospital Efficiency Program Energy Audit, Red Bank, NJ:** Performed comprehensive Level 3 Investment Grade Audit of entire facility and recommended Energy Conservation Measures to be implemented.
 - **Robert Wood Johnson University Hospital, 2nd Floor Renovation, New Brunswick, NJ:** Redesigned the 2nd floor of this 1958 building to provide the hospital with a 15,000 sf expanded Pediatric department. Existing building MEP and FP systems were closely evaluated in order to utilize as much of the existing equipment as possible which had been recently installed.
 - **Robert Wood Johnson University Hospital, 3rd Floor Tower Building Renovation, New Brunswick, NJ:** Renovated the 11,200 sf, 3rd floor of the Tower Building. The former ICU and NICU suites were demolished and a new Obstetrics department was put in its place.
 - **Robert Wood Johnson University Hospital, Operating Room Renovation, New Brunswick, NJ:** Completed construction documents for the renovation of the operating room soiled work room and adjacent work involving the replacement and relocation of sterilizing equipment, reworking of the HVAC and electrical systems, along with a new sprinkler system for the entire area.
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- **Robert Wood Johnson University Hospital – New Brunswick, Energy Efficiency Upgrades, New Brunswick, NJ:** As part of the PSE&G Hospital Efficiency Program, the Central Chilled Water plant was redesigned to be integrated with the Children’s Chilled Water plant system. The existing Children’s Plant System was redesigned with a single new 700 ton unit, and new pumps and interconnected with the main system to operate as a single 2900 ton variable speed system. The North Chiller plant was redesigned from the existing primary secondary to be a primary variable flow system. Lighting throughout 1.7 million SF of hospital was replaced with efficient LED fixtures and lamps. Air Systems, Motor Replacements, Variable Flow Kitchen Hood Systems and Heating Plant systems were also studied as part of the project for energy efficient upgrades.
 - **Robert Wood Johnson University Hospital, 3rd Floor Tower Building Renovation, New Brunswick, NJ:** Renovated the 11,200 sf, 3rd floor of the Tower Building. The former ICU and NICU suites were demolished and a new Obstetrics department was put in its place.
 - **Southern Ocean Medical Center, NJNG Hospital Efficiency Program Energy Audit, Manahawkin, NJ:** Performed comprehensive Level 3 Investment Grade Audit of entire facility and recommended Energy Conservation Measures to be implemented.
 - **State of New Jersey, Public Health, Environmental and Agricultural Laboratory, West Trenton, NJ:** New construction of a 190,000 sf public health lab including BSL-3 suites, analytical laboratories, biological and chemical terrorism testing labs, and necropsy suites.
 - **Summit Medical Group/MD Anderson Cancer Center, Outpatient Treatment Building, Florham Park, NJ:** Core & Shell and Tenant Fit-out of new 130,000 sq.ft 4-story building housing primarily cancer care clinics, but also a cafe, retail pharmacy and executive offices suite. Cancer care program includes Radiation Therapy (3 linear accelerators, for high-dose radiation/ brachytherapy, and nuclear medicine), an Imaging Suite (CT, PET/CT, MRI and x-ray) including Breast Center (mammography), and Infusion Clinic with USP 797/800 chemo-therapy compounding pharmacy, and medical & surgical care clinics. Underground parking garage.
 - **Temple University School of Dentistry, Dental Compressed Air System Study, Philadelphia, PA:** Survey and evaluation of existing compressed air systems serving clinical patient care, teaching and simulation area and dental laboratories. Recommendations were made for improvements and upgrades which the University plans to implement under a future project.
 - **The Pennsylvania State University, Borland Labs Renovation, University Park, PA:** Historical renovation of approximately 76,000 sf of the University’s existing Dairy Sciences building to a classroom and office building for the College of Arts and Architecture. The new program includes studio classrooms and general classrooms for the University, as well as digital and graphic arts rooms, archival storage rooms and photo and video production studios. The project achieved LEED®-NC Gold certification.
 - **The Pennsylvania State University, Burrowes Building, University Park, PA:** Renovation of approximately 130,000 sf to the 1920’s central core and 1960s north and south wing additions of the building for the College of Liberal Arts. The project included the replacement of all existing MEP/FP systems and the installation of new central air-conditioning systems and a fire sprinkler system and the construction of new connectors between the core building and wings.
 - **The Richard Stockton College of New Jersey, New Campus Center, Pomona, NJ:** The
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new 150,000 sf Campus Center houses meeting spaces, dining facilities, a bookstore, shops and functions as a gathering place for all students on campus. The building utilizes the existing geothermal well fields on campus and is designed for LEED®-NC Silver certification

- **University of Nevada, Las Vegas, Greenspun College of Urban Affairs, Las Vegas, NV:** The 5-story, 117,000 sf new all-digital, high definition broadcast facility includes television studios, non-linear editing bays, radio production and performance studios, writing labs, advanced editing labs, a converged media lab and a 200-seat auditorium built to accommodate video and audio production. This building achieved LEED®-NC Gold certification. Sustainable design features include chilled beams used for heating and cooling, a louvered canopy that shades the courtyard and reduces solar gain, and use of a comprehensive photovoltaic (PV) array that accounts for more than 15 percent of the total annual energy for the building.
 - **University of Pennsylvania, Levine Hall, Philadelphia, PA:** New construction of a 48,000 sf computer science building with faculty offices, an auditorium and multiple computer laboratory spaces. Renovations in adjacent connecting buildings included new loading dock, cyber cafe, and bioengineering labs.
 - **University of Pennsylvania, McNeil Center for Early American Studies, Philadelphia, PA:** New construction of a 13,000 sf office building with an auditorium and conference space.
 - **University of Pennsylvania, Vagelos Laboratories Energy Efficiency Evaluation, Philadelphia, PA:** Performed deep energy audit and energy modeling of existing 120,000 sf chemistry research lab building to find aggressive energy reduction opportunities. Building had been recently retro-commissioned, but still performing below expectations. We found the building to be already utilizing many state-of-the-art technologies and operating approaches, but we studied out-of-the-box energy reduction measures, including detailed energy modeling and suggested measures that could reduce energy consumption by about 15% annually.
 - **Veterans Administration Medical Center, Ambulatory Care, Spinal Cord Injury Unit and Laboratories, Cleveland, OH:** Facility master plan and engineering design to accommodate several major additions (to the existing hospital) -- emergency department, ambulatory care clinic, clinical laboratories, and spinal cord injury patient wing – plus renovations of existing emergency department, ambulatory care clinic, pharmacy, and laboratory spaces. Energy master plan and design included and “Energy Center” addition housing a full replacement.
 - **Veterans Administration Medical Center, Nursing Home Care Unit Renovation, Brecksville, OH:** Renovation of three-wing hospital-based nursing home care facility including Physical and Occupational Therapy facilities, new AHU’s, new central chilled water plant utilizing existing steam, and new VAV air distribution system.
 - **Veterans Administration Medical Center, Emergency Department Renovation, Cleveland, OH:** Short-term renovation of existing Emergency Medicine Department to accommodate planned major construction of a new ambulatory care wing which will house a new emergency room. The renovation also includes upgrades to meet current CDC tuberculosis design requirements.
 - **Veterans Affairs Medical Center, Health Care Center, Winston-Salem, NC:** New 375,000 sf outpatient health center including surgery, sterile processing department, laboratories and cleanroom compounding suite. Clinics include behavioral health, women’s health, radiology, primary care, audiology and pulmonary medicine. Project
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includes a police department with readiness training room and weapons storage. The building is designed for LEED® Gold certification.

- **Virginia Commonwealth University, Medical College of Virginia, Student Center, Richmond, VA:** This project renovated the existing recreation center by adding 15,000 sf of dining and server space, as well as upgrading 10,000 sf of fitness areas and adding student services, offices and meeting rooms. Fitness areas include expanded and enhanced fitness center with cardio, selectorized and free weight equipment; completely renovated, air conditioned locker facilities; 2 court gymnasium for basketball, volleyball, and badminton; racquetball courts; group exercise classes; and a 25 meter heated indoor pool. This building achieved LEED®-NC Silver certification.
 - **Virginia Commonwealth University, Monroe Park Campus, Recreational Complex, Richmond, VA:** This 158,000 sf historic renovation and addition contains a lap pool and recreational pool; a four court gymnasium for basketball, volleyball, table tennis and badminton; rock climbing wall with bouldering/caving wall; 18,000 sf fitness center with cardio, selectorized and free weight equipment; indoor running track; indoor cycling room; 2 racquetball courts; day use and rental locker facilities; and office space. This project achieved LEED®-NC Gold certification.
 - **Virginia Commonwealth University, Snead Hall, School of Business & East Hall, School of Engineering, Richmond, VA:** New construction of a 4-story 260,000 sf academic and research building. The 145,000 sf School of Business houses classrooms, labs, case study and cohort classrooms, break out rooms, state-of-the-art lecture halls, multimedia teaching facilities, a simulated trading room, a cafe, faculty offices, administrative offices, and related support space. The 115,000sf School of Engineering focuses on digital and information technology laboratories, with an emphasis on electronic and chemistry research laboratories.
 - **Virtua Health, Our Lady of Lourdes Medical Center, IT Infrastructure Replacement, Camden, NJ:** Phased replacement of entire IT and Technology Systems infrastructure in existing, fully operational hospital.
 - **Virtua Health, Lourdes Medical Center of Burlington County, IT Infrastructure Replacement, Willingboro, NJ:** Phased replacement of entire IT and Technology Systems infrastructure in existing, fully operational hospital.
 - **Virtua Health, Bergen-Passaic Eye Surgery Center, OR Expansion, Passaic, NJ:** Phased expansion of existing, fully operational ambulatory surgery center including two new ORs, new Sterile Processing Suite, renovated Prep and Recovery area, new Laser and Femto procedure rooms, reconstruction of staff locker room and new conference/break room.
 - **Weill Cornell Medical College, Gene Therapy Core Facility cGMP Laboratory Rehab, New York, NY:** Renovations and upgrades to a 1,800 sf cGMP Gene Therapy production lab suite to modernize and correct persistent physical and functional issues within the facility. HVAC systems were upgraded to improve classification from ISO 8 (Class 100,000) to ISO 7 (Class 10,000) clean environments for production, filling and storage while reducing overall energy consumption.
 - **William Paterson University, Science Hall, Wayne, NJ:** This 155,000 sf renovation and 70,000 sf addition includes teaching and research laboratories, NMR suite, vivarium, greenhouse, electron microscope suite, and lecture rooms/auditorium space. It houses the Biology, Chemistry and Physics, Environmental Science and Geography, Mathematics, and Computer Science departments. The building is designed for LEED®-EB certification.
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- **Yale University, Class of '54 Chemistry Research Building, New Haven, CT:** New construction of a 104,000 sf chemistry research building housing laboratories, lab support space, an instrumentation room complete with two NMRs, computational rooms, a multipurpose conference/lecture facility, as well as faculty and graduate student offices. This project achieved a LEED®-NC Silver rating.
- **Yale University, Environmental Science Center, New Haven, CT:** This 100,000 sf addition to the Yale Peabody Museum of Natural History houses collections of fossils, plant and insect life, reptiles, and amphibians. The facility includes clean (Class 100) chambers, computer rooms, workrooms, a spectroscopy facility, teaching and office areas.
- **Yale University, Kline Biology Tower, New Haven, CT:** Renovated this 120,000 sf molecular and cellular biology building through 2 infrastructures upgrades and 10 different programmatic renovations.
- **Yale University, Kline Geology Laboratory, New Haven, CT:** This project included HVAC renovations to this 110,000 sf building which is home to the Geology Department offices, labs, seminar rooms, auditorium and archival storage areas. It replaced and upgraded all central HVAC equipment and infrastructure. Construction was phased to accommodate full occupancy and use of facilities throughout construction, including temporary AHUs located on site adjacent to building.
- **Yale University, Malone Engineering Research Building, New Haven, CT:** New construction of a 65,000 sf engineering building housing research and physical science teaching laboratories, electron microscopes, a class 1000 cleanroom, a vivarium, lab support spaces, and faculty and graduate student offices. This project achieved a LEED®-NC Gold rating for its sustainable features which include a light reflecting roof, daylight dimming controls, and waste water reuse and purification systems, controls, and waste water reuse and purification systems.
- **Yale University, Osborn Memorial Laboratory, New Haven, CT:** The project completely renovated this 50,000 sf building that includes laboratories, offices and growth chambers. The project also included mechanical, electrical and plumbing infrastructure upgrades for the building.