



High Performance Healthcare

Major Health Partners Hospital Shelbyville, Indiana

CMTA Overview

CMTA is a multi-specialty firm that focuses on building systems engineering that ensures cost effective, energy efficient, high performance buildings. We are true partners who are vested in the long-term success of our buildings, which is measured by exceeding the expectations of building owners and managers, and maintaining the health and comfort of the occupants. In addition to engineering great building systems, at CMTA, we invent products, set national goals, and work to transform the market to improve results for everyone. We define our innovative approach to engineering as ... **Building Science Leadership**.

We are **Data Driven, Results Proven**. We have collected over 15 years of actual utility data on our projects that allows us to continually improve our approach. This database and our years of high performance design experience means we understand how to make these buildings a reality without extra first costs.

Our engineering expertise includes the following services:

- Mechanical Engineering
- Electrical Engineering
- Plumbing Engineering
- Fire Protection Engineering
- Zero Energy and Renewable Engineering
- Communications and Audio Visual Design
- Technology Infrastructure Design
- Security System Design
- Energy Modeling
- Lighting Design
- Geothermal Engineering
- Construction Administration
- Commissioning Services
- LEED Consulting
- WELL Building Consulting and Certification
- Energy Star Certification
- Sustainability Consulting
- Performance Contracting
- Energy Management

By the Numbers

- 400+ Employees
- 15 Offices Nationwide, including Columbia, SC
- 121 PEs
- 7 RCDDs
- 8 Certified GeoExchange Designers
- 15 Certified Energy Managers
- 21 Commissioning Agents
- 90 LEED APs
- 12 WELL APs
- Licensed in 48 States, D.C., Puerto Rico, and Ontario, Canada



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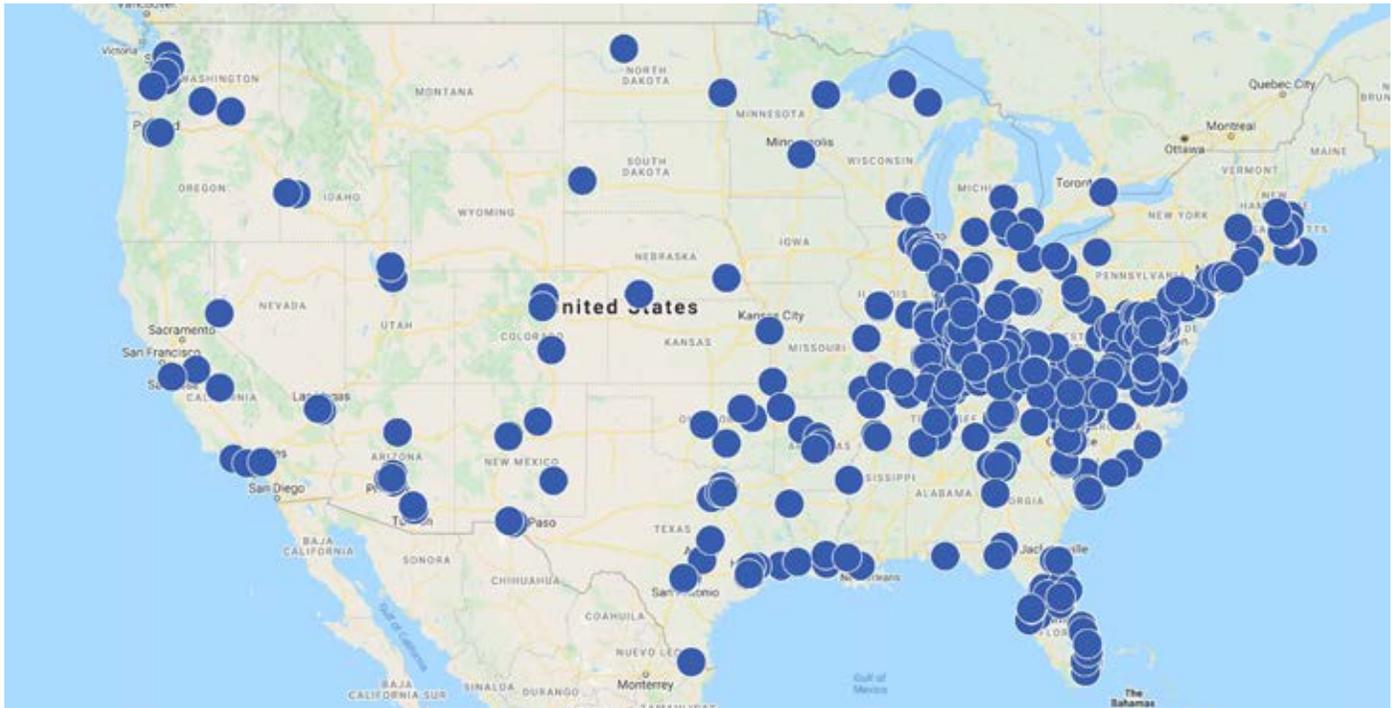
National Healthcare Expertise

CMTA's healthcare experience extends from coast to coast and encompasses all types of facilities from inpatient unit renovations to full-scale replacement hospitals and every type of outpatient or inpatient setting. We bring our energy efficient focus to healthcare design and work with our hospital clients to improve their energy efficiency and reduce maintenance and operations costs. Our experience includes:

- Ambulatory Care Centers
- Cancer Treatment Centers
- Central Plants
- Dining
- Endoscopy Centers
- Heart Centers
- ICUs
- LDRs
- Gero Psych
- Hybrid ORs
- Laboratories
- Long-Term Care
- Medical Office Buildings
- MRI and Imaging Centers
- Nursing Units
- Pharmacies (USP 800)
- Radiopharmaceutical Facilities
- Behavioral Health
- Cardiac Cath Labs
- Central Sterile
- ED Additions / Renovations
- Operating Rooms
- Proton Beam Therapy Centers
- Technology / Security
- NICUs



North Shore Medical Center
Salem, Massachusetts



CMTA Healthcare Projects

Long-Lasting Partnerships

Since 1968, CMTA has maintained long-lasting and productive relationships with clients in the health care industry across the nation, proudly holding the project title of Engineer of Record. The firm has completed numerous master planning, MEP infrastructure renovations and new construction projects for a wide-variety of hospital types ranging from critical access hospitals to sprawling medical campuses. A few of these notable relationships are highlighted below.



11 yrs.
of service | **35**
projects



15 yrs.
of service | **250+**
projects



24 yrs.
of service | **100+**
projects



15 yrs.
of service | **150+**
projects



Mass General Brigham



MASSACHUSETTS
GENERAL HOSPITAL

30 yrs.
service | **80**
projects



NORTH SHORE
MEDICAL CENTER

25 yrs.
of service | **150**
projects



BRIGHAM AND
WOMEN'S HOSPITAL

20 yrs.
of service | **25**
projects



Franciscan HEALTH

7 yrs.
of service | **25**
projects



BAPTIST HEALTH*

15 yrs.
of service | **131**
projects



Beth Israel Deaconess
Medical Center

7 yrs.
of service | **35**
projects



10 yrs.
of service | **53**
projects

Healthcare Technology

Healthcare facilities are supported by some of the most complex, mission critical technology systems designed today. An average hospital technology system runs a complicated combination of infrastructure, communication, and security features many of them wireless and all of them essential to daily patient care. CMTA's Technology Solutions Group led by Tom Sorrel brings decades of experience designing low-voltage systems for the healthcare market across the country. We design healthcare technology to be a staff multiplier, increasing efficiency and allowing caregivers greater flexibility as they perform their duties, and ultimately to improve patient care while ensuring privacy and safety. Another key feature of our team's focus is flexibility and expandability. Healthcare technology is a rapidly advancing field; our team designs to ensure flexibility in the short-term and expandability for future needs. We achieve these results while maintaining a focus on bottom line costs. Tom believes that the key to managing all these criteria successfully is to engage the facility owner and the design team at the start of a project. His team leads charretting events and work groups to gather input and develop a technology and security plan that achieves the clients goals and ensures buy-in from the design team, department level end-users, and facility managers alike.

Technology Expertise

- Sensitive area access control systems
- IP video surveillance
- Structured cabling (voice, data, video, building automation)
- Building Systems / Central plant connectivity
- Wireless IP telephone and Ethernet
- Wireless patient monitoring
- Tele-medicine/ videoconferencing
- Nurse call and paging systems
- Personnel, pharmaceutical, and logistical asset tracking
- New infant security tracking
- Public address systems
- Local area networks (LAN)
- Patient Electronic Record Data center/PBX facility design and project management
- IT systems commissioning
- Security assessments
- Campus and single building master planning



IU Health Regional Campus

Bloomington, Indiana

Project at a Glance

Size: 735,000 Square Feet

Cost: \$350,000,000

Completed: 2021 estimated

Awards / Certifications:

- LEED Silver Targeted

IU Health Regional Campus

CMTA Technology Solutions led by Tom Sorrel provided full technology/security design for this complex health and academic campus. Our team started the project with technology design charrettes and co-authored the electronic safety and security master plan. The design involved all information services/information technology, communications and low voltage structured cable design. In addition, this included inside and outside plant fiber and Telephony, Vocera, Emergency Phones, Telecommunications Equipment / Room (TE/TR) fit-out design, wireless access point design, PACS, CATV and Radio Frequency (RF) systems. Infrastructure, physical security as well as high levels of cyber security were designed to support Electronic Health Records Management (EHRM) systems.

To enhance security, CMTA included door access control systems to grant restricted access and log those that enter and exit protected spaces. The Radio Frequency (RF) systems included Real Time Locating System (RTLS) for staff, patients and equipment. Video surveillance (VMS) and full access control (SMS) systems were established across the entire campus. Additionally, building TE/TRs along with a redundant EF were located within the facility while ensuring size and distance requirements were compliant with the off-site backup data center. CMTA developed open specifications for the campus security system to facilitate competitive bidding.

Complex Health Care Design

For more than 50 years, CMTA has provided services for some of the nation's largest, complex medical campuses. We understand the impact that design decisions and construction process can have on the delivery of care, and are deeply familiar with the maze of regulations and standards that affect design and construction. A few examples are highlighted below:

Baptist Health Lexington

Lexington, Kentucky

- 450,000 SF Patient Tower Addition
- 900,000 SF Renovation
- 500,000 SF Parking Garage
- New Central Utility Plant

Cape Cod Hospital

Hyannis, Massachusetts

- New 190,000 SF High-Rise Clinical Building with 2 Linear Accelerators
- New Central Plant

Baptist Health Hardin

Elizabethtown, Kentucky

- 950,000 SF Campus Expansion
- Replacement of Central Plant

St. Elizabeth Cancer Care Center

Edgewood, Kentucky

- 582,000 SF Replacement Facility

Massachusetts General Hospital

Boston, Massachusetts

- New 10-story 515,000 SF Acute Care Facility

North Shore Medical Center

Salem, Massachusetts

- 226,000 SF IR and Cardiology Addition
- LEED Gold

Norton Brownsboro Hospital

Louisville, Kentucky

- 300,000 SF Facility (2009), 172,000 SF Addition (2020)
- ENERGY STAR score: 97
- LEED EB Certified

Indiana University Health, Bloomington Academic Health Center

Bloomington, Indiana

- New 620,000 SF Medical Center
- 115,000 SF Academic Facilities

Additional Expertise

Medical Education

CMTA has worked on more than 100 college and university campuses across the U.S. including IU Health, University of Cincinnati, Northern Kentucky University, Tufts University, University of Louisville and the University of Kentucky. Our projects include classroom buildings, research labs, teaching labs, clean rooms, vivariums, libraries, data centers, health care facilities, medical and dental schools, nursing programs, physical therapy, allied health professions, campus infrastructure, high voltage distribution and central utility plants.

Life Sciences

CMTA's work in life sciences and research stretches from the research campuses of Massachusetts to the BioHealth Capital Region (Maryland) and throughout the Midwest. These projects involve cutting edge academic research facilities, such as the National Institutes of Health and Medimmune.

Medical Office Buildings

CMTA's office environments are moving beyond energy efficiency and sustainability to lead the industry's focus on improving occupant health. Our team has a vast understanding of the building performance metrics and design strategies that improve the built environment for occupant comfort and wellness.

Behavioral Health

We have a strong presence in the behavioral health arena and engineer hospitals for the major behavioral health providers across the country. We have designed over 100 behavioral health hospital projects in 28 states, including over 3,500 beds, over 3 million square feet and over \$1 billion in behavioral health construction. We have LEAN hospital design expertise and are well-versed in working through regulatory issues with all parties on the front-end, in order to make projects a success.



High-Performance Health Care

CMTA's core market is health care. Our experience in this industry extends from coast to coast (and Ontario and Puerto Rico) and encompasses all types of facilities from inpatient unit renovations to full-scale replacement hospitals and every type of outpatient or inpatient setting.

Energy Efficient Focus

We bring our energy efficient focus to our health care and work with our hospital clients to improve their energy efficiency and reduce maintenance and operations costs. Since a significant portion of a hospital's life cycle cost is attributed to energy costs, we understand that a dollar saved in energy can result in 20 dollars of additional revenue equivalent (based on a typical health care profit margin). Efficient buildings use less power and frequently allow the emergency power generation resources to serve more of the building than would otherwise be possible.

Our Approach

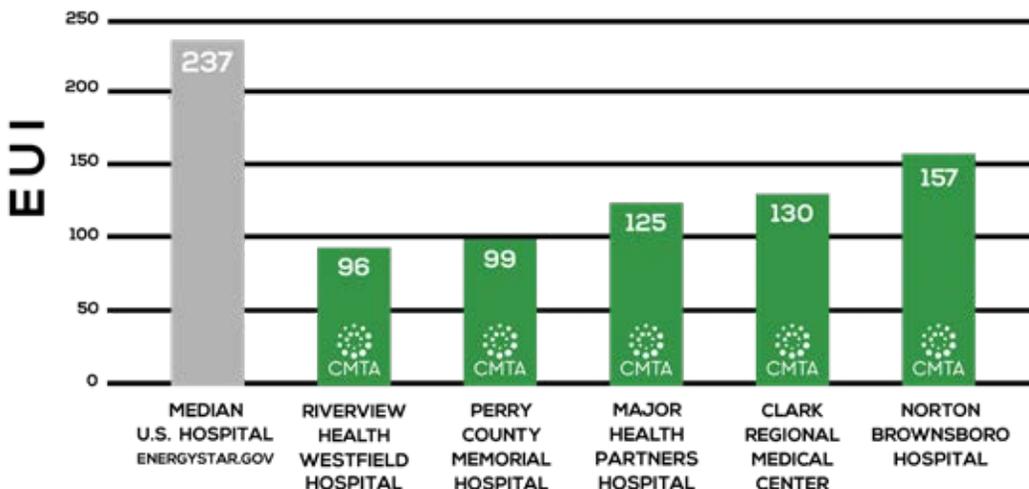
- Focused on reducing maintenance and operational costs
- 15-year benchmarking program
- Performance based design
- Real world numbers on first costs and ROI

High Performance Strategies

- Energy efficient boilers and chillers
- Heat recovery chillers
- Geothermal HVAC
- Air-change set backs
- LED lighting
- Occupancy controls
- Equipment scheduling/controls
- Retro-commissioning

Reducing Energy Costs

- Guaranteed Energy Savings Projects
- Energy Management
- Deep Retrofits
- Commissioning/Facility Optimization
- Energy Benchmarking and Analysis
- Utility Bill Auditing and Tariff Analysis



Two of CMTA's recent replacement facilities are among the most energy efficient hospitals in the United States. One Indiana hospital has an Energy Use Intensity (EUI) of 96, while the other has an EUI of 99. Our most recent replacement hospital has an EUI of 125 using conventional boiler and chillers.



Staff lounge flooded with natural daylight - UofL Novak Children's Center
Louisville, Kentucky

Lighting Design

The Patient and Staff Experience

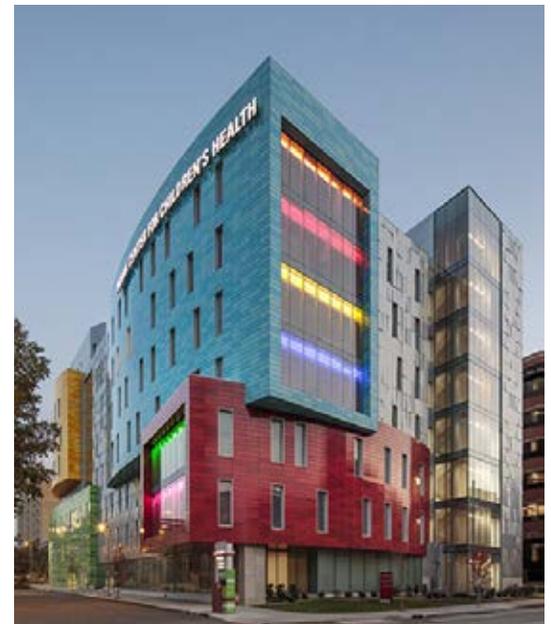
We want patients to feel as if at home — lighting is a large part of creating this inviting atmosphere. By using the latest technology and cost effective strategies, we aim to create a more comfortable, less-institutional feel, while still being functional.

At *UofL's Novak Children's Center*, free-form cove lighting and exterior color changing lighting was incorporated in response to the younger patients. Ample lighting was also provided in staff lounges as well as waiting areas.

In addition to providing natural daylight, circadian lighting strategies are utilized to help support the sleep health of both patients and staff. This is accomplished by providing high-energy melanopic lighting during the day, and warmer, more soothing lighting after hours.

Cost Efficiency

By focusing on "right-lighting" spaces and reducing the complexity of the lighting controls, we are able to achieve significant cost savings. Right-lighting is accomplished with extensive light modeling to select the precise light fixtures for each space while optimizing lumen packages to ensure maximum energy savings. Lighting controls are kept simple to avoid frustration while still realizing maximum energy savings and code compliance. These methods deliver a more energy efficient and functional end result without sacrificing aesthetics and visual comfort.



Exterior Color-Changing Lighting
UofL Novak Children's Center
Louisville, Kentucky

Commissioning Expertise



Baptist Health Lexington Lexington, Kentucky



Novak Center for Children's Health
Louisville, Kentucky

Having a commissioning team that understands complex systems and sequences is crucial to successful building operations and energy management strategies. The intent of commissioning services is to help set goals that enhance the outcome of the project. This ranges from startup and training to performance monitoring and owner follow-up.

Our proactive approach ensures that, in addition to the efforts performed by onsite superintendents, effective QA/QC measures are implemented. We often identify new opportunities—whether in factors specific to brands of equipment or unique building considerations—that were not apparent prior to the construction phase.

We see ourselves as the owner's eyes and ears; an on-site representative helping to orchestrate the successful implementation of systems.

Our experience includes:

- Commissioning
- Enhanced Commissioning
- Retro Commissioning
- Continuous Commissioning
- Envelope Commissioning
- Building Pressure Testing
- Design / Application Review Services



Major Health Partners Hospital
Shelbyville, Indiana



St Elizabeth Cancer Center
Edgewood, Kentucky

Zero Energy Design

CMTA's Zero Energy philosophy is simple: Strive for drastic energy reduction then consider options for renewable energy. This focus on energy efficiency drastically reduces the cost of the renewable energy required to achieve zero energy. We focus on energy reduction through a variety of means including MEP systems, site orientation, building envelope, types of windows, building insulation systems, soffit conditions, infiltration of exterior openings, plumbing, water reclamation, occupancy schedules, maintenance and retro commissioning.

4.75 million sq. ft.

of Zero Energy Facility Design

40 projects
nationwide

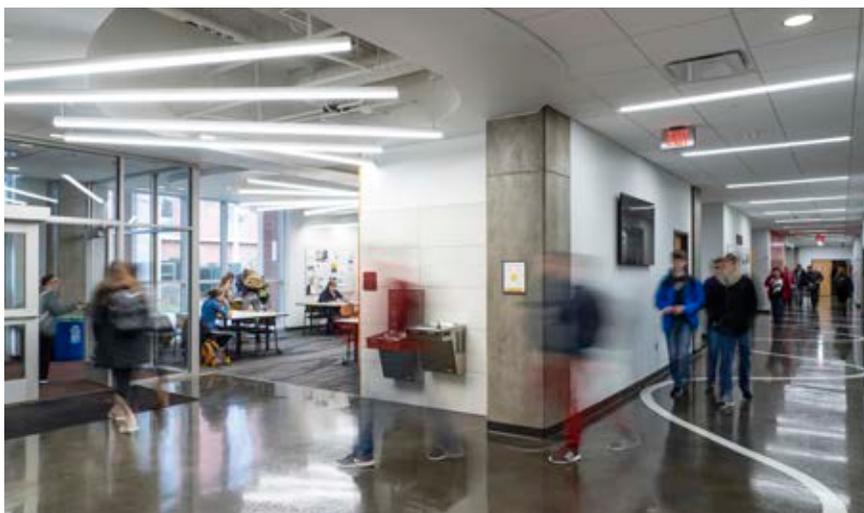
21 complete
and operational

130+ Zero Energy
Capable Projects
operating at 35 kBtu/sf/yr or less

194 ENERGY STAR projects
39 with perfect scores of 100

75
Megawatts

of renewable power
designed/installed



WKU Ogden College Hall, Science & Research Center | WELL Gold, LEED Gold
Bowling Green, Kentucky

Design with a focus on Occupant Health and Wellness

We spend most of our lives in buildings and it is important that architects and engineers understand how the building affects the health and wellness of the occupants. This interaction between the building and the occupants is especially critical in health care where the environment must promote healing and wellness.

CMTA's buildings are moving beyond energy efficiency and sustainability to lead the industry's focus on improving occupant health. Our team has a vast understanding of the building performance metrics and design strategies that improve the built environment for occupant comfort and wellness. This knowledge allows us to be successful in incorporating strategies that improve human health and focusing on the wellbeing of the occupant while still maintaining budget and energy efficiency goals.

The International WELL Building Institute (IWBI), a public benefit corporation, is leading the movement to promote health and wellness in buildings. Their WELL Building Certification is the leading tool for advancing health and wellbeing in buildings globally. CMTA has embraced this new certification and now has three buildings targeted to WELL Building Certification including our newest office building in Louisville, Kentucky. In addition, two of our staff engineers are WELL Accredited Professionals.

WKU Ogden College Hall Science & Research Center Project at a Glance

Energy savings strategies are projected to save the university \$150,000 annually in utilities.

Cost: \$48,000,000

Size: 4-story, 82,000 SF

Completed: 2018

Construction Type: New/Renovation

Project Experience



Westfield Hospital Westfield, Indiana

Riverview Health Westfield Hospital

The Nation's Best Performing Hospital

The outstanding energy results of Riverview Health's Westfield Hospital match its beauty. Comparing the ENERGY STAR hospital portfolio manager to a median hospital, this facility utilizes almost half the energy. This facility energy costs are around \$2 per square foot while the average median facility would use almost \$4 per square foot. Westfield Hospital has been requested by the American Society of Healthcare Engineers to discuss the methodology used to have a hospital performing with an EUI of less than 100.

Project at a Glance

Size: 107,000 Square Feet

Cost: \$35,000,000

Completed: 2018

Awards / Certifications:

- AIA Healthcare Design - 2019
- Indy Chamber Monumental Design

98.6

Targeted EUI

96

Performed EUI

"CMTA provided great energy modeling data to ensure the financial performance of the geothermal system. Now that the system has been in operation for a year, its energy use is extremely low and we are realizing the predicted return on the investment."

Scott Tripp
Riverview Health



Cincinnati Children's Hospital College Hill Behavioral Health Cincinnati, Ohio

Cincinnati Children's Hospital

CMTA was selected by Cincinnati Children's Hospital to design and relocate HVAC, MEP, and Fire Protection systems.

Multiple sustainable HVAC approaches are in consideration, including water-cooled chillers and high-efficient boilers with air handling units (AHUs), air-cooled chillers and high-efficient boilers with AHUs, water cooled magnetic bearing chillers, Geothermal VAV heat pump AHUs, and water source heat pump units.

By use of 400-foot-deep geothermal well fields, the systems will synchronize heat for the entire facility. The geothermal option also allows for easier achievement of LEED certification, and a smaller mechanical footprint.

The existing generator will be relocated across the access drive, adjacent to the back lot. To accomplish this task, the existing emergency switchgear adjacent to said generator will be demolished, and new switchgear will be also provided within the new location.

Project at a Glance

Size: 170,000 Square Feet

Cost: \$102,000,000

Completed: 2022 estimated



Bloomington Hospital & Academic Health Campus Bloomington, Indiana

Bloomington Hospital and Academic Health

IU Health committed to building a new facility in Bloomington, and they are now following through with that promise. Construction is ongoing for the new 735,000 square foot acute care facility along with an educational facility tied to Indiana University. The facility will bring state of the art equipment and procedures to the residents of Bloomington and surrounding areas. Services will include Emergency, Obstetrics, diagnostics, ICU, and surgery, to name a few. Construction is set to be complete by early 2021.

At the start of the project, IU Health had an aggressive plan for involving the local design community to help with the many pieces of this facility. CMTA was a part of that design group, and at the time, our Technology Solutions group was the only firm selected to work on all buildings and parts of the project. As the project started to develop and schedules refined, CMTA was asked to meet the design needs of the entire acute care facility. We were able to assemble a team from our 400 plus employees to meet the schedules and design needs of IU Health. We are proud of this project and even more proud of the team that made it happen.

Project at a Glance

Size: 735,000 Square Feet

Cost: \$350,000,000

Completed: 2021 estimated

Awards / Certifications:

- LEED Silver Targeted

214

Baseline EUI

161

Targeted EUI



Boston Medical Center Boston, Massachusetts

Boston Medical Center

Boston Medical Center's (BMC) main objectives for a cogeneration plant was to reduce energy cost, reduce their carbon footprint and to increase the resiliency of their inpatient care buildings, totaling 1.5 million square feet during a major campus consolidation effort. A single 2 Megawatt internal combustion engine cogen system offered BMC the best return on investment and enough power to keep their most critical inpatient care buildings energized and heated in the event of an extended normal electric power outage or other catastrophic event. This cogen system provides \$1.5M of annual operating savings.

As significant energy reductions are a cornerstone goal for BMC, so is carbon neutrality. As a result, BMC engaged in the largest collaborative power purchase agreement (PPA) in the United States. 16 megawatts of the 60 megawatt solar field is allocated to BMC to make BMC a zero-energy campus. Through the cogen, PPA and the campus consolidation strategies, BMC has reduced their carbon footprint by 90% since 2011.

Project at a Glance

Size: 1,500,000 Square Feet

Cost: \$13,500,000

Completed: 2019

Awards / Certifications:

- Zero Energy
- Practice Greenhealth: Top 25 Green Hospital Nationally
- Becker's 60 Greenest Hospitals in America

2 Megawatt

Cogeneration System

\$1.5 Million

Annual Utility Savings

"CMTA's knowledge and attention to detail made this difficult project a major success with energy savings of \$1.5M. Thanks to their expertise, we have the most resilient hospital cogen plant in Boston."

Bob Biggio
Boston Medical Center



Henry Ford Hospital Detroit, Michigan

Henry Ford Hospital

The new Henry Ford Hospital - composed of 18 floors, 2,600,000 SF, and 880 patient beds - is replacing the old hospital facility and expanding its North Campus to accommodate the community's need for inpatient and outpatient care. Design is expected to be completed in December 2022, and construction completed in December 2025.

To determine how Henry Ford's existing campus MEP infrastructure would correlate, expand to serve the replacement hospital and materials building, and achieve high-performance goals, CMTA was selected to lead and direct the hospital's masterplan MEP study components.

CMTA and the project team developed campus infrastructure concepts that reduced construction costs and allowed the hospital to take advantage of existing MEP assets and significantly reduce energy costs.

Design Innovations include a new chilled water plant that interfaces with the existing campus systems, condensing boilers, high-efficiency chillers, and a new geothermal system for energy and carbon emissions reduction.

Project at a Glance

Size: 2,600,000 Square Feet

Cost: \$1,044,959,000

Completed: 2025 estimated



Baptist Health Hamburg Lexington, Kentucky

Baptist Health Hamburg

Baptist Health system has engaged the design services of CMTA to masterplan and design a new healthcare campus in the Hamburg area of Lexington, Kentucky. This new campus is to be built on the 129 acre green field property that Baptist owns between I-75 and Polo Club Boulevard. The masterplan for the site includes a full 400-bed hospital along with full service of outpatient facilities, specialty clinics, and other healthcare facilities.

The CMTA team has evaluated numerous strategies to accomplish a highly sustainable building that is extremely energy efficient which is one of Baptist's core project objectives. CMTA performed sunlight studies on the building to help guide the adding of shading on the windows most affected by direct sunlight. CMTA has included a heat recover chiller in the variable flow primary central plant design that will take waste heat that is produced in the normal process of making chilled water for the campus and use it to provide "free" heat to the campus. CMTA has also eliminated steam from the entire campus with the exception of sterilization needs. In order to do this CMTA is utilizing adiabatic humidification in the air handling units.

Project at a Glance

Size: 400 Beds

Cost: 230,000,000

Completed: 2024 estimated



MD Anderson Alkek Tower Houston, Texas

MD Anderson Alkek Tower

Located in the heart of the Houston Medical Center, the Alkek Building is the main inpatient hospital complex for The University of Texas MD Anderson Cancer Center. The original 12-story, 500,000+ square foot, hospital was constructed in the late 1990s. Ten years later, a 500,000 square foot vertical and horizontal expansion was undertaken to add a 12-story addition above the existing 12-story hospital.

This project consists of a full floor renovation to facilitate the use of technologies consistent with those being used for patient care on the upper expansion floors. The existing protective environment rooms on the east side of the floor are being demolished and 18 new rooms for palliative care are being built back. New HVAC, plumbing, electrical, and lighting are being provided on the east side to accommodate the palliative care patients.

Because the hospital is fully occupied, the design and construction must be phased to minimize disruption to patients and hospital staff. Construction on this \$10,000,000 project is scheduled to be complete in July 2021.

Project at a Glance

Size: 40,000 Square Feet

Cost: 10,000,000

Completed: 2021 estimated



L. Thomas Sorrell

RCDD, LEED AP BD+C NICET III, CHC

Security / Audio Visual / Information Technology Designer

Profile

Mr. Sorrell leads CMTA's technology and security design team. His years of experience in the technology, audio visual, and security arena include extensive work in the design of systems for health care facilities, including the IU Health Bloomington Regional Academic Health Center currently under construction.

As a member of the Building Industry Consulting Service International (BICSI) Speaker's Bureau, Mr. Sorrell frequently speaks at conferences around the United States, especially when discussing building and campus security, technology and safety.

Role

Mr. Sorrell will apply his unique knowledge of the IU Health system as well as security/safety to your project in order to exceed the expectations of the Owner and Architect. He will bring his many years of experience to your project related to security systems, cameras, video, access control systems, etc. as well as informing the architectural design. He works meticulously to deliver open-protocol systems in lieu of relying on vendors to layout these systems.

Education

Associate of Applied Science, Electrical Engineering

University of Louisville

Registrations

- Registered Communications Distribution Designer #171229R
- LEED Accredited Professional BD+C
- National Institute for Certification in Engineering Technologies - Level III
- Certified Healthcare Contractor

32 Years of Experience

Joined CMTA in 2015

Related Projects

IU Health

Bloomington, Indiana

IU Health Bloomington Hospital Regional Academic Health Center

- New \$400,000,000 Health and Academic Campus
- Security, IT, AV and Nurse Call

Major Health Partners

Shelbyville, Indiana

Major Hospital

- New 299,300 SF Replacement Facility

University of Louisville

Louisville, Kentucky

Novak Center for Children's Health, New Health Science Center

- LEED Gold - Targeted

University of Kentucky

Lexington, Kentucky

University-Wide Security / AV

- Lead Security Systems Designer
- Developed Campus Audiovisual and Security Standards

Northern Kentucky University

Highland Heights, Kentucky

Health Research and Innovation Building

- 210,000 SF Addition / 108,142 Renovation
- Comprehensive Health Science Education and Applied Research Facility

