



HENDERSON
BUILDING SOLUTIONS

A PARTNER FOR THE LIFE OF YOUR BUILDING

HENDERSONBUILDING.COM
HENDERSONENGINEERS.COM

FIRM PROFILE

Henderson Building Solutions is a national engineer-led design-build and commissioning firm. We offer single-source solutions for turnkey building systems projects.

WE SEE THINGS A LITTLE DIFFERENTLY

We're changing the industry by combining engineering knowledge with in-the-field expertise to assess, plan, deliver, and sustain holistic solutions for the life of your building. We believe to construct great buildings you must think of them as more than structures. The vision must capture experiences that will take place inside. It's about the people, the experiences, and potential inside. When you work with us, you'll quickly realize that we're different. We're as passionate about people as we are about our work, and we stay focused on our clients' needs and the needs of the people who will use the spaces we work in.

WE DO THINGS A LITTLE DIFFERENTLY

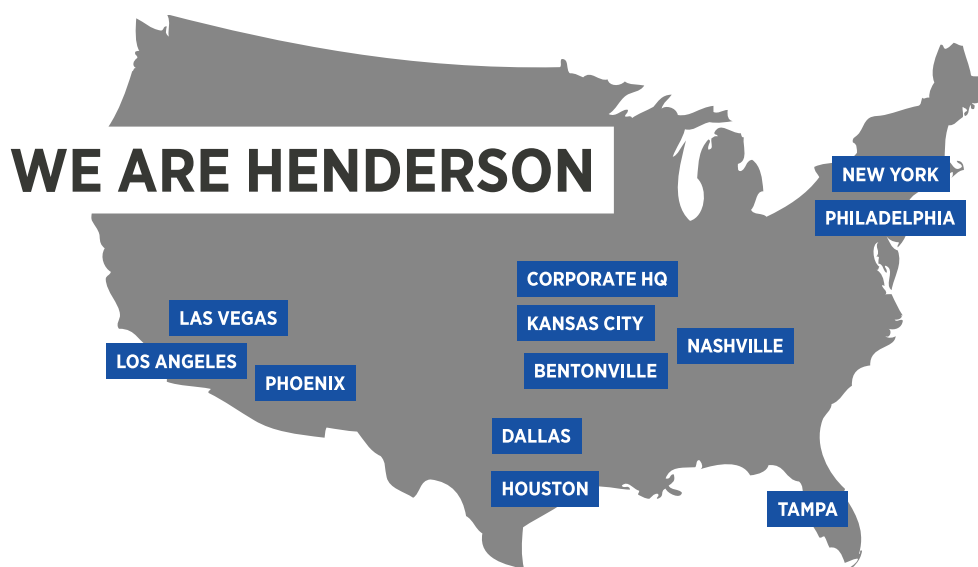
It's right there in our name – we are about solutions. When you work with us, your project becomes our project: there's always a solution, and we'll work tirelessly to find it, down to the last detail. As a single-source solution for turnkey building systems projects we're backed by Henderson Engineers, our sister company. Together we're bridging the gap between design and construction and redefining how buildings come to life.

FOUNDED

2013

MARKETS

Aviation
Entertainment
General Merchandise
Healthcare
Higher Education
Infrastructure
K-12 Education
Mission Critical
Science & Technology
Specialty Retail
Sports
Warehouse



CONSTRUCTION MANAGEMENT

WE BELIEVE IN A BETTER PROCESS



Running a facility isn't easy. Most of our clients spend their days putting out fires, wishing they had a large enough team to get everything done, and hoping something important doesn't break. That's why they have us — Henderson Building Solutions. We aren't your average contractor, we're better. We're a transparent partner to assess, plan, deliver, and sustain holistic solutions for the life of your building.

WHY US?

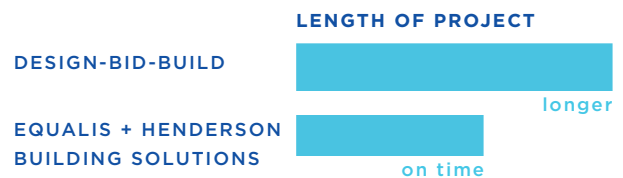
- Dependable schedule
- Budget monitoring
- Site & installation logistics
- Early procurement of equipment
- Expedited schedule
- Single-source of responsibility

THE PROOF IS IN THE DATA

We don't expect you to just take our word for it. Two of the biggest headaches in a construction project are cost and schedule. The graphs on the right show how our process stacks up to industry standards.

Leveraging expertise in design and construction allows us to provide detailed site logistics and expedited equipment procurement. This effort also enhances our ability to deliver solutions faster and more economically than traditional construction methods.

SCHEDULE COMPARISON



TRACK RECORD

ON AVERAGE, OUR PROJECTS ARE UNDER BUDGET BY	4.8%
AVERAGE CHANGE ORDER RATE	1.2%

OUR APPROACH

THE VALUE OF COOPERATIVE PURCHASING

CONTRACTOR		PARTICIPATING ENTITY
A single response replaces numerous, time-consuming bids	Save Time and Money	Competitive Bid process already satisfied
Offer your full line of products & services	Full Line of Contracted Solutions	Choose the products & services they need/want
Leverage the relationships you have earned	Trust and Relationships	Select the vendor/rep they want
Promote value and quality over price	Low-Bid, Low-Quality Responses	Avoid unpleasant experience of low-bid, low-quality awards

JOB ORDER PROCESS



VALUE ADD SERVICES

HENDERSON BUILDING SOLUTIONS

At Henderson Building Solutions, we make buildings work. We know that a building can't just look good; it has to function for the needs of the people who use it everyday. That's why we offer full-service solutions that go beyond traditional commissioning and construction management.

Our expert staff includes commissioning agents, construction managers, controls specialists, estimators, energy managers, test and balance experts, master electricians, and professional engineers. We're committed to the life of each building, not just a single project — consistently focused on the details that make or break the functionality of a space.

BUILDING MONITORING & CONTROLS SYSTEMS

- Assessments
- Building Analytics
- Building Automation Systems (BAS)
- Constant & Continuous Supervision
- Controls Integration
- Direct Digital Controls (DDC)
- Monitoring
- Optimize Maintenance

BUILDING OPTIMIZATION

- Building Envelope Testing
- Elevator Modernization
- Refrigeration
- Systems Diagnostics & Troubleshooting
- Test & Balance

COMMISSIONING

- New Building Commissioning
- Ongoing Commissioning
- Re-Commissioning
- Retro-Commissioning

ELEVATOR & CONVEYANCE SYSTEMS

- Assessment & Consulting
- Systems Commissioning
- Turnkey Elevator & Conveyance Modernization, Replacement, & Upgrades

EMERGENCY PREPAREDNESS

- Generator, ATS, & Emergency Power Testing
- RF Testing
- Security Systems Commissioning
- System Integrity & Sustainability

ENERGY AUDIT

- Energy Conservation Measures (ECMs)
- Energy Rebates
- Utility Bill Analysis

FACILITY CONDITION ASSESSMENT

- Comprehensive Cost Analysis
- Issue Identification & Diagnosis
- Solutions Roadmap

MASTER PLANNING

- Comprehensive Implementation Plan
- Overall Plan for Improvements & Growth
- Review Current Infrastructure

REGULATORY COMPLIANCE

- Annual Life Safety Testing
- Compliance Documentation Management
- Joint Commission Preparedness

RETRO-COMMISSIONING

- Condition & Operation Investigation
- Diagnosis & Analysis
- Implementation

VALUE ADD COMMISSIONING

BRIDGING THE GAP BETWEEN DESIGN & CONSTRUCTION



OUR PHILOSOPHY (TECHNICAL COMMISSIONING)

At Henderson Building Solutions, we adhere to a technical commissioning philosophy. It is a hands-on process where the commissioning team comprises experts in the fields of engineering, TAB, and controls. The commissioning team performs the following key tasks:

- **Lead the commissioning process with collaboration.** We bring everyone to the table early to create open communication and trust throughout the entire project.
- **Serve as your technical expert.** We bridge the gap between design and construction, then between the construction and facility operations teams to make sure information is fully understood.
- **Provide lessons-learned from previous projects.** Our unique role throughout the process and experience troubleshooting common issues of these spaces allows us to know what works and what doesn't.

With these objectives at the core of our organization, we help the entire team have a successful project. Our approach to commissioning helps prevent schedule and budget impacts, improves the quality of the completed facility, and delivers optimal building operation from day one. With critical laboratory facilities, it is vital for HVAC, emergency power, and controls systems to function flawlessly.

DESIGN PHASE

During design, we take an active role in reviewing the drawings and specifications for overall functionality and to verify they meet your specific needs. Our design reviews confirm the drawings are clear and complete, have accounted for future maintenance and accessibility, and provide enough information to properly test the building's operation.

As part of this process, we develop a commissioning plan and detailed commissioning specifications for the contract documents. These documents clearly outline the commissioning process and the specific roles and responsibilities of all parties. Allowing everyone to understand their part in the success of the project and avoid change orders later.

According to a recent report*, the cost of performing commissioning, on average, is paid back in under five years from energy savings alone.

* Report Number 56637, Lawrence Berkeley National Laboratory, Portland Energy Conservation Inc., Texas A&M University Energy Systems Laboratory, December 2004: *The Cost-Effectiveness of Commercial-Buildings Commissioning: A Meta-Analysis of Energy and Non-Energy Impacts in Existing Buildings and New Construction in the United States.*

When we consider that research tells us 80% of a building's cost is in ongoing operations and maintenance, it stands to reason that the efforts put in place to safeguard the integration and efficiency of all building's systems are critical.

CONSTRUCTION PHASE

Early in the construction phase, we review contractor submittals concurrent with the design team. While we don't approve or reject submittals, we do review them to make sure they align with the contract documents and your needs. We provide review comments to the design team, based on this criteria and our experience in the field, which is then included in the designers formal submittal review.

Before construction starts, we sit down with the contractors to determine how commissioning activities best fit into the overall project schedule. The goal of this collaboration is to ensure a complete, efficient commissioning process without impacting the completion date. With this information, we can set the most ideal schedule for our kickoff meeting, site visits, witness system testing, and functional performance testing.

Based on each design, we create custom pre-functional checklists for each project. These checklists are vital to verify equipment and systems are installed safely, completely, and in accordance with contract documents and industry standards. This allows us to identify installation issues early, so any modifications have the least possible impact on project schedule and budget.

During start-up, we work closely with the contractors to help coordinate when the start-up and testing activities will take place. Our team assists in developing start-up plans and helps the contractors schedule these activities.

Near the end of the construction phase, we develop custom functional performance tests for each piece of equipment and the integrated system. These test documents verify each piece of equipment and all modes of operation, control setpoints and sequences, and confirm proper integrated operation. This process is imperative to delivering a properly controlled and operated building. Our team will also confirm all equipment is operating according to the design intent. Before execution, we review the testing documents with the contractors and equipment vendors to ensure a seamless testing process during the acceptance phase.

ACCEPTANCE PHASE

During the acceptance phase, we are typically onsite full-time. This portion of the project is where we test the equipment and systems using functional performance test scripts and verify all other testing is completed.

Testing and balancing is one of the most critical activities to ensure systems operate properly. However, this activity is often not completed accurately for any number of reasons. To achieve proper balance, we verify a sample of the readings and complete a comprehensive review of the testing and balancing report.

This is also when we, along with the contractors and equipment vendors, execute the functional performance tests. During this process, we document the operation of each piece of equipment and the integrated systems, to ensure proper operation. All readings and adjustments are recorded for future reference, such as troubleshooting system operation.

Operation and maintenance manuals are often turned over to your facility team this point. We review these manuals to ensure that all documents are provided and all necessary components are present. These manuals, together with our project documentation, create the maintenance plan. This plan helps the operations staff understand when maintenance is required for each piece of equipment, how to perform maintenance, and checklists to record those efforts.

At the conclusion of the project, we compile our final commissioning report. This document provides a complete summary of the work that was completed, including all documents produced during the commissioning process, and provides details regarding the acceptance of each system.



OCCUPANCY PHASE

The best way to confirm proper system operation is to test it under all possible scenarios. Because design conditions only occur for a few days each season, it is rarely possible to test the system when these are present. Our approach is to simulate all conditions through the building management system (BMS) and other methods to verify the system responds reliably. Using the trending capabilities of the BMS, or by placing our own data loggers, we monitor the performance of the systems during both the peak and off-peak seasons. If the system responses are not satisfactory, we collaborate with the contractors and operating personnel to adjust the system parameters accordingly. In our experience, testing only for the peak conditions is not advisable, as part load is where the system will operate a majority of the time.

Approximately 10 months after substantial completion, we return to the site to meet with the operating personnel. The purpose of this visit is to verify that the systems and equipment are still operating properly and to verify that no issues have been experienced. If deficiencies are identified, we help engage the contractors prior to the expiration of their warranty to help you make the most of your warranty.

Median whole-building energy savings of 16% for existing buildings and 13% for new construction were found in a recent cost benefit report.

* Report by Lawrence Berkeley National Laboratory, July 2009: *Building Commissioning, A Golden Opportunity for Reducing Energy Costs and Greenhouse Gas Emissions*. Prepared for California Energy Commission, Public Interest Energy Research (PIER).

TEAMWORK FOCUS

Our approach focuses on a team mentality. We believe that only in a collaborative environment can the project reach its full potential and you realize the highest possible value from the commissioning process. As the commissioning agent, we are in a unique position to guide the entire team to achieve better project outcomes by focusing on solutions. The process isn't about finger pointing, it is about making the building work. We have the opportunity to support an effective decision-making process so that the project is always moving towards completion.

To accomplish this, we have frequent face-to-face conversations. This fosters more positive relationships. We strive to be over-communicators, so that all parties are informed of the status of the commissioning process. A successful project is not only your success, but a success for every member of the project team. Everyone makes mistakes, nobody is perfect, but it is more important to deliver a fully functional building than to place blame. We work with the end in mind.



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