Building Innovation Through Research
# Table of Contents

03  **ABOUT US**

04  **THE CHALLENGE**

05  **OUR IMPACT**

<table>
<thead>
<tr>
<th>Case Story</th>
</tr>
</thead>
<tbody>
<tr>
<td>Embodied Carbon in Construction Calculator (EC3)</td>
</tr>
<tr>
<td>Professional’s Guide to Managing the Design Phase of a Design-Build Project</td>
</tr>
<tr>
<td>Tall Building Initiative: Guidelines for Performance-Based Seismic Design of Tall Buildings</td>
</tr>
<tr>
<td>SpeedCore: Rethinking How High-Rise Buildings are Designed and Built</td>
</tr>
</tbody>
</table>

16  **OUR PARTNERS**

19  **JOIN IN**
ABOUT US

We are a catalyst advancing innovation.

A private 501(c)(3), independent nonprofit, the Charles Pankow Foundation serves a unique role in the architecture, engineering, and construction (AEC) industry, providing leadership and catalytic funding to those with the knowledge and influence to drive the industry forward. The Foundation embodies the spirit of Charles Pankow’s legacy, vision, innovation, and leadership.

Join us in creating better ways to design and build.

“The Pankow Foundation introduced the AEC industry to the incredible potential for non-proprietary research to spur innovation in building construction. Industry professionals and academia working collaboratively to identify and solve problems is a model that continues to produce inspiring results with increasing industry impact.”

RICHARD M. KUNNATH
PE, Board President
Charles Pankow Foundation
THE CHALLENGE

Delivering Fundamental Change to Advance an Industry

The AEC industry is rooted in 20th-century practices and know-how. Innovative solutions lack the proper investment. Safety, productivity, cost and schedule reliability, and environmental transparency are just a few of the major issues the AEC industry faces. The Charles Pankow Foundation is committed to finding practical solutions to address the most pressing industry challenges.

Our values are the building blocks of meaningful progress:

INNOVATION
We transform ideas into scalable solutions for the benefit of the AEC industry.

PRACTICALITY
We only fund research that provides direct and immediate benefits.

COLLABORATION
We bring together those with the know-how and influence to tackle industry-wide challenges.
Our goals are ambitious and require significant investment and influence. Our success is driven by convening the brightest minds in the industry to solve complex problems. We cannot go it alone if we expect to make an impact on the industry. The results of our work have improved financial, environmental, and societal outcomes.

“Industry changing, impactful research which can be implemented TODAY is the focus of the Pankow Foundation’s work. Significant improvements in efficiency, cost savings, safety and process management have resulted in better buildings across the country and around the world.”

RON KLEMENCIC
PE, SE, Hon. AIA, Chairman and CEO, Magnusson Klemencic Associates; Board Director, Charles Pankow Foundation
Our number-one criterion for funding research is impact.

**DRIVE INNOVATION**
Establishing advances that maximize performance through practical research.

**DELIVER CERTAINTY**
Enabling teams to deliver on time and within budget through new systems and industry capabilities.

**IMPROVE SAFETY**
Developing the resources necessary to support the well-being of individuals and the built assets.

**IMPROVE CAPABILITIES**
Providing the playbooks for those driving industry transformation.

We’ve Awarded:

- **90+** research grants
- **40+** universities and industry organizations awarded grants

Industry Support Includes:

- **50%+** co-funding from industry partners on research and knowledge guides
- **110+** industry partners providing in-kind and financial support
- **425+** leaders and influencers on industry advisory panels

In 2019, our active research portfolio included $5.4M in grants for 23 projects involving 15 universities and industry partners.
Industry Standards Shaped

» Minimum Design Loads and Associated Criteria for Buildings and Other Structures (ASCE/SEI 7)
» Building Code Requirements for Structural Concrete (ACI 318)
» Specification for Structural Steel Buildings (ANSI/AISC 360)
» National BIM Standard-United States (NBIMS-US)

Books & Knowledge Guides Funded

» Professional’s Guide to Managing the Design Phase of a Design-Build Project
» Tall Building Initiative: Guidelines for Performance-Based Seismic Design of Tall Buildings
» Life Cycle Assessment of Buildings: A Practice Guide
» Onsite Non-potable Water Reuse Practice Guide
» BIM Project Execution Plan (BxP) Guide: An Introduction for Those New to BIM
» Owner’s Guide to Maximizing Success in Integrated Projects

Digital Tools Created

» Embodied Carbon in Construction Calculator Tool
» MasonryiQ
CASE STUDY

Embodied Carbon in Construction Calculator (EC3)

The first nonproprietary, open-access tool changing the way we navigate embodied carbon.

CHALLENGE

The Need to Reduce Carbon Emissions Associated with Building Materials

SOLUTION

A Breakthrough in Sustainability

RESULT

Market Transformation

“Building on our investments in smart buildings and energy efficiency, our use of the tool enables us to take a data-driven approach to make decisions about construction with respect to carbon, selecting raw materials that reduce building embodied carbon emissions by as much as 30 percent.”

Katie Ross
Global Real Estate & Facilities Sustainability Lead
Microsoft
Embodied Carbon in Construction Calculator (EC3)

The first nonproprietary, open-access tool changing the way we navigate embodied carbon.

CHALLENGE
The Need to Reduce Carbon Emissions Associated with Building Materials

The industry lacked a nonproprietary, open-access tool focused on supply chain emissions of construction material.

Building accounts for nearly 40% of worldwide carbon emissions. In fact, by 2060, the amount of building floor space will double—the equivalent of building New York City every month for 40 years. Accompanying that growth comes an increase in embodied carbon, the carbon emissions created by extracting materials and making building products.

Leaders from the AEC industry needed better supply data and guidance to inform environmentally driven decisions and create an ecosystem that supports innovative products, materials and tools.

RESULT
Market Transformation

Projects using the EC3 tool managed to reduce their embodied carbon emissions by 30%, without significant financial impact.

In less than a year, EC3 was launched—the first open-access digital tool that allows for benchmarking, assessment and reductions in embodied carbon for use during the design and procurement phases of new construction projects.

More than 6,500 registered users have adopted the EC3 tool,

including Microsoft, which is constructing 17 new buildings and 2.5 million square feet of new workspace as part of their Campus Modernization Project. The EC3 tool’s data also paves the way for policymakers to develop procurement and building code-level policies that will influence the future of building.

SOLUTION
A Breakthrough in Sustainability

EC3 is an open-access digital tool to help benchmark, assess, and reduce embodied carbon.

Catalytic investment by the Charles Pankow Foundation and over 30 future-focused, industry-leading organizations supported the collaborative development of the Embodied Carbon in Construction Calculator (EC3) tool.

Using the tool allows the comparison and validation of potential building materials, helping designers choose more sustainable options during the design, material specification and procurement processes.

The tool enables a carbon budget that can be assessed according to a material’s impact and financial viability.
CASE STUDY

Professional’s Guide to Managing the Design Phase of a Design-Build Project

Pushing the potential for project design and construction.

CHALLENGE
Integrating the Design and Construction Processes

SOLUTION
A Better Way to Build

RESULT
Industry Best Practice

“The work the Foundation does is noble and selfless for the betterment of our industry. Together with industry colleagues, we figure out what we can do to improve things for everybody, not just for ourselves.”

Greg Gidez
AIA, FDBIA, Director of Design Services
Hensel Phelps; Director, Charles Pankow Foundation
CHALLENGE

Integrating the Design and Construction Processes

In most traditional forms of project delivery, the owner is caught in a liability gap between designer and contractor.

Silos have created an environment that pits project team members against each other, leading to delays, overruns, and lawsuits. Design-build is an alternative project delivery system that solves these issues with the owner managing only one contract with a single point of responsibility.

Although design-build has existed for decades, there was no consensus on the best way to practice it. However, upskilling the capabilities of talent to fulfill the rapidly changing AEC industry was essential. The Charles Pankow Foundation recognized the need to gather the premier experts in the industry to centralize best practices for design-build and develop better approaches to design and construction project delivery.

SOLUTION

A Better Way to Build

The Foundation introduced the only guide that helps managers upskill and succeed in managing the design phase of a design-build project.

The Charles Pankow Foundation convened AEC leaders and funded the creation of the Design Management Guide for the Design-Build Environment. The guide aims to help owners, designers, and builders of a design-build project achieve success via the unique—and relatively new—role of design phase manager.

This guide gives practitioners the tools, information, and advice they need to fulfill their obligations. The adoption of the guide’s practices led the Foundation to fund its successor, the Professional’s Guide to Managing the Design Phase of a Design-Build Project.

RESULT

Industry Best Practice

Now nearly half of the nation’s projects use the design-build method.

Design-build was once considered an alternative way to deliver design and construction projects. Today it is a best practice, and with good reason. Design-build continues to outperform other delivery systems in cost, schedule, growth measures, construction, and delivery speed.

Design-build has been shown to be 102% faster than traditional design-bid-build and 61% faster than construction manager at risk.

View the Guide  »

Revisiting Project Delivery Performance  »
We want to build great buildings that allow excellent work environments. Performance-based design has allowed us to develop logical, safe, effective designs not riddled with unnecessary excess because of somewhat unrelated building code requirements. If we were forced to follow prescriptive building codes alone, some buildings might not be built at all, and that would be unfortunate.

Paul Paradis
Senior Managing Director
Hines

CASE STUDY

Tall Building Initiative: Guidelines for Performance-Based Seismic Design of Tall Buildings

We cannot control seismic events, but we can create measures to stay safe when they occur and minimize repair time and costs.

CHALLENGE
High Cost of Damage in Earthquakes

SOLUTION
Setting a New Industry Standard

RESULT
A Foundation for Building Innovation

“We want to build great buildings that allow excellent work environments. Performance-based design has allowed us to develop logical, safe, effective designs not riddled with unnecessary excess because of somewhat unrelated building code requirements. If we were forced to follow prescriptive building codes alone, some buildings might not be built at all, and that would be unfortunate.”
CHALLENGE
High Cost of Damage in Earthquakes

Without guidance on a common approach, practitioners found Performance-Based Seismic Design (PBSD) difficult to implement.

At the beginning of the millennium, surge in demand for tall buildings, especially in desirable but earthquake-prone areas of the U.S., proved challenging for those designing to prescriptive codes. High cost of damage and innovations in computational methods inspired new approaches. Building codes allowed an alternative to prescriptive design for tall buildings, Performance-Based Seismic Design (PBSD), an approach that offers initial and long-term financial advantage. But there was no common approach to PBSD of tall buildings.

SOLUTION
Setting a New Industry Standard

Industry guidance advanced a new design methodology and pushed the needle forward on seismic design for tall buildings.

The Charles Pankow Foundation funded the University of California at Berkeley’s Pacific Earthquake Engineering Research Center’s development of the Guidelines for Performance-Based Seismic Design of Tall Buildings. Written by those with the knowledge and influence, These Guidelines enable more efficient design and use of innovative technologies to achieve the status-quo building performance or better.

RESULT
A Foundation for Building Innovation

Use of the Guidelines aided and accelerated PBSD acceptance.

Confidence in the guidance and approach cut permit review and approval times from 1 to 2 years to 6 to 10 months. PBSD allows the use of conventional framing systems at greater heights. It also serves as a gateway for use of advanced materials and enables the emergence of novel framing systems like SpeedCore, a rebar-free, concrete-filled composite steel plate shear wall system. SpeedCore lived up to its name when it was used in the building of the 850-foot-tall Rainier Square Tower in Seattle, which wrapped up eight months sooner than it would have with conventional systems.

The Guidelines’ success creates a path to invest in additional methodology, such as the Prestandard for Performance-Based Wind Design. The Prestandard is being considered by the ASCE 7 committee, which develops the model code language adopted by jurisdictions across the U.S.
CASE STUDY

SpeedCore: Rethinking How High-Rise Buildings are Designed and Built

Delivering simpler, faster, and safer construction.

CHALLENGE
Reducing the Time of Construction of High-Rise Buildings

SOLUTION
Game-Changing Modular Framing System

RESULT
A Faster, Better Way to Build

“We are pleased to have been a part of the first steel concrete sandwich core, now referred to as a ‘SpeedCore.’ We are celebrating it by showing off a portion of the raw core in our lobby as ‘artwork.’ But more importantly, the savings in schedule translates to fewer carrying costs and an earlier revenue stream.”

Cindy Edens
Executive Vice President – Director of Development, Wright Runstad & Company
CHALLENGE
Reducing the Time of Construction of High-Rise Buildings

Essential to the design of high-rise buildings is sufficient structure to address the safety and comfort of the building’s occupants and with minimal impact on floor area and building usage.

Concrete walls enclosing elevator and mechanical shafts often serve double duty, providing safe enclosures to these critical building functions while also resisting wind and earthquake forces. These external forces necessitate the addition of substantial amounts of reinforcing steel in the concrete. With more reinforcing steel, congestion results, impacting the time of construction and ease of concrete placement. These heavily reinforced walls, bespoke building to building and floor to floor, are built in place, and require temporary formwork serving as the mold during concrete placement. Formwork material and labor are among the greatest costs in building with reinforced concrete. With this construction method comes additional safety concerns.

The material, trade and construction method complexities associated with traditional wall systems add time to the schedule and cost to the project.

SOLUTION
Game-Changing Modular Framing System

With the objective of bringing greater speed to high-rise construction, the Charles Pankow Foundation, in collaboration with industry partners, supported key experimental tests to inform the design of a novel wall system.

Dubbed SpeedCore, the system is constructed of prefabricated modular steel sandwich panels, stacked onsite and field-filled with concrete. Eliminating the need for temporary formwork and reinforcing steel cages simplifies onsite trade and material management, saving time and potentially lives.

RESULT
A Faster, Better Way to Build

The Proof of Concept, an intense collaboration of design and construction teams along with the material suppliers, resulted in 40% less time to build. Subsequent improvements in connection detailing and fire protection applications are expected to generate additional schedule savings. Foundation-led research supported the decision to include the novel framing system in the National Earthquake Hazards Reduction Program (NEHRP) Recommended Seismic Provisions for New Buildings and Other Structures, 2020. Additionally, the research underpins the development of industry design guidelines, detailing guidelines, and design specifications for seismic and non-seismic applications.

These results reflect the Foundation’s commitment to its namesake and the industry: delivering better ways to design and build.

SpeedCore: Rethinking How High-Rise Buildings are Designed and Built

Delivering simpler, faster, and safer construction.
Our Partners
Invest In Game-Changing Results
Transformation does not happen alone. Steadfast support from partners has made the Foundation a leader in research for the design and construction industry, creating practical, nonproprietary, and evidence-based solutions that deliver real-world impact.

No organization can accomplish these monumental projects alone—but together we can. Hear what our partners are saying:

“The Charles Pankow Foundation has always been very open about sharing its findings publicly. Shining a light on its work not only helps to accelerate acceptance of the new technology, it also accelerates adoption by other engineers.”

Jack Moehle
PhD, PE, Principal Investigator, Guidelines to Performance-Based Seismic Design of Tall Buildings; Chair of ACI 318-19 Building Code Committee

“Clark Construction is delighted to participate in ground-breaking research that supports the incorporation of high-strength reinforcing steel in the ACI Code and into practice. It’s a great opportunity to help significantly improve quality, cost, and schedule all at the same time.”

David Wilson
Vice President
Clark Construction Group
“If the Foundation went away tomorrow, there would be a noticeable slowdown in the innovation of technology for designers to use in buildings and it would be more expensive.”

RONALD HAMBERGER
Senior Principal, Simpson Gumpertz & Heger; Chair, ASCE 7 Standards Committee (2011-present)
Let’s Build Better Together

Scale innovation across AEC and beyond.

» Contribute funds and in-kind services
We are receiving more game-changing grant submissions than ever before. Don’t let meaningful innovation sit idle. By providing financial support or in-kind materials and services, you help spur much-needed change in our industry.

» Share your ideas
Sharing your inspiration could lead to the next breakthrough. You don’t have to realize it on your own. Partnering with the Foundation can provide the support you need to realize your vision.

“What truly advances our industry, what propels all of us is not that idea that is held close. It’s that idea that is shared.”

RON KLEMENCIC
PE, SE, Hon. AIA, Chairman and CEO, Magnusson Klemencic Associates; Board Director, Charles Pankow Foundation

JOIN IN

Contribute funds and in-kind services
We are receiving more game-changing grant submissions than ever before. Don’t let meaningful innovation sit idle. By providing financial support or in-kind materials and services, you help spur much-needed change in our industry.

Share your ideas
Sharing your inspiration could lead to the next breakthrough. You don’t have to realize it on your own. Partnering with the Foundation can provide the support you need to realize your vision.

“What truly advances our industry, what propels all of us is not that idea that is held close. It’s that idea that is shared.”

RON KLEMENCIC
PE, SE, Hon. AIA, Chairman and CEO, Magnusson Klemencic Associates; Board Director, Charles Pankow Foundation
Contact Us

With so many challenges facing our industry, there is no better time to invest in its progress.

Contribute to our cause at
www.pankowfoundation.org/donate

Contact us at
(360) 326-3767
info@pankowfoundation.org