

WINTER 2021

ENGINEERING INC.

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Engineers With Disabilities
Bring Distinct Expertise

ACEC New York
MO Profile

Tighe & Bond's
Culture of CSR

THE
ENGINEERING
FIRM
OF
THE

FUTURE

How have new technologies, the pandemic, and social unrest
forced firms to quickly adapt?

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2021 VIRTUAL

Annual Convention & Legislative Summit

April 26-28, 2021

#ACEC2021ANNUAL

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THE ENGINEERING FIRM OF THE FUTURE

Technology, COVID-19,
and civil unrest have all
disrupted the industry.
Has *your* firm adapted?

"The rate
of change in
our industry
is greater
than at any
time in our
history."

Peter DiMaggio
Co-CEO
Thornton Tomasetti

The ACEC Research Institute provides the industry with cutting edge trend data, research and analysis to help firm owners make decisions and arm the Council with information to advance engineering's essential value to a broad audience.

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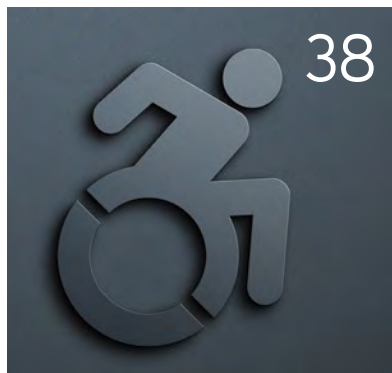
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Council Ramps Up Efforts to Keep Members Informed

While the president's COVID package is moving through budget reconciliation in Congress, our focus has shifted to what the second agenda item might entail. Thankfully, statements by the administration and newly confirmed Transportation Secretary Pete Buttigieg increase optimism that infrastructure will play a critical role in the economic stimulus effort.

We cannot allow this momentum to go to waste. Accordingly, the Council has ramped up its efforts to advocate for the industry and to keep members continuously updated on ever-evolving legislative and business trends affecting firm efficiency, opportunity, and the bottom line. Our efforts are off to a great start.

Beginning with the new year, our popular *Engineering Influence* podcast began providing the weekly *Government Affairs Update* podcast, which already has featured insights from noted legislative stakeholders, including the U.S. Chamber's Vice President of Transportation and Infrastructure Ed Mortimer, and expert analysis from our Government Affairs team. We invite you to listen in every Friday for a fresh take on what's happening in Washington.

Early this year, the ACEC Research Institute released its groundbreaking "2020 Engineering Industry Economic Contribution" study, which examines the engineering and related design sector's considerable impact on our nation's economic well-being.

For the first time, we can put hard numbers behind what we have all innately known. Study findings show that in 2019, the civil, structural, and related engineers who make up the ACEC community are 24 percent of all engineers working across every sector of the economy and generated \$40 billion in personal property taxes, \$12.7 billion in sales taxes, and \$11.8 billion in property taxes, resulting in nearly \$600 billion in economic impact (*see ACEC Research Institute on page 10*).

The now weekly *Government Affairs Update* podcast and the "Engineering Industry Economic Contribution" study are both accessible through the Council website.

This issue of *Engineering Inc.* also presents industry expert projections on how the engineering firm of the future will differ from today (*see page 16*), plus the contributions disabled engineers make to the industry (*see page 38*).

Plans are coming together nicely for our upcoming 2021 Virtual Annual Convention, set for April 26–28 and featuring the always popular compelling lineup of speakers, advanced business education, and a virtual exhibit hall.

Make plans now to attend this annual cannot-miss event.



Charles J. Gozdziwski
ACEC Chairman




Linda Bauer Darr
ACEC President & CEO



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Engineering Inc., Volume 31, Number 5 (ISSN 1539-2694), is published quarterly by the American Council of Engineering Companies (ACEC), 1015 15th Street, NW, 8th Floor, Washington, D.C. 20005-2605. Periodicals postage paid at Washington, D.C., and at additional mailing offices. Annual subscriptions are \$24 for members (included in dues as a non-deductible amount); \$45 for U.S. non-members; \$65 for institutional subscriptions. Back issues are \$15.

POSTMASTER: Send address changes to *Engineering Inc.*, c/o ACEC, 1015 15th Street, NW, 8th Floor, Washington, D.C. 20005-2605.
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Non-Hydropower Renewables Surging in Power Sector Market

For engineering firms working in the renewable energy sector, it may seem that the stars have aligned. Several converging factors—government incentives, increasing demand, and technological advances—have made renewables the fastest-growing market in the power sector.

Non-hydropower renewables are the only power generation type that will grow through 2022, says the U.S. Energy Information Administration (EIA).

“We’re in the midst of what Stantec refers to as the energy transition,” says Sohrab Sobhani, regional sector leader for wind energy at Stantec. “Some of the more traditional sources of power will remain, but they will provide a foundational support role going forward.”

Up until now, renewable sources have been an alternate source of energy. As we progress through the “energy transition,” green energy will become the primary source from a volume production standpoint.

Renewables still have a long way to go to become the dominant source, but they are moving rapidly in that direction. In EIA’s “Short-Term Energy Outlook,” released in January, renewables other than hydropower accounted for 12 percent of total power generation in 2020, and that share is forecast to rise to 14 percent in 2021 and 16 percent in 2022.

In EIA’s “Annual Energy Outlook 2020,” which looks forward to 2050, “the relatively sharp growth in renewables seen during the past 10 years will continue through the projection period. Total renewable generation [including hydropower] exceeds natural gas-fired generation after 2045...and renewable generation grows faster than overall electricity demand.”

“Over the past few years, we’ve seen steady growth in our renewables practice,” says Tetra Tech President Leslie Shoemaker. “We expect this growth to accelerate with the alignment of climate change priorities and increased focus on renewables.”

Or, as Black & Veatch Senior Vice President and Solar Lead Paul Skurdahl says, “The future is so bright, I gotta wear shades.”





BLUE PLANET STUDIO/GETTY IMAGES

GETTING TO COST PARITY

Renewable energy generation has been growing for decades, but it has long relied on considerable financial assistance at both the federal and state levels to compete with thermal generation systems. At the national level, the investment tax credit for solar and the production tax credit (PTC) for wind and other forms of renewable power generation have helped the industry attract investors, but they came at a cost as Congress often dithered over extensions.

"Historically, when the PTC in wind was discontinued, development in the following year in onshore wind fell by up to 90 percent," says Sobhani. "I don't think that will be the same going forward because wind has become more self-sustainable without the requirement for subsidies."

Both subsidies remain, however, as they were extended in the huge stimulus package passed at the end of 2020.

"That will be a near-term boost to the market," says Erin Toelke, vice president of energy programs at Tetra Tech. "Projects that were going to be rushed to start construction in 2021 will have a little more time, and we're also seeing smaller clients pick up activity in the past couple of weeks because they're going to have more access to capital from people looking for the tax equity."

While the tax credits have supported the supply side of the market, the demand side was largely driven by the states' renewable portfolio standards (RPS) program, which requires that a specified percentage of the electricity that utilities sell come from renewable resources.

According to a 2019 Berkeley Lab report, "roughly half of all growth in U.S. renewable electricity generation and capacity since 2000 is associated with state RPS requirements."



ALEXIS/GETTY IMAGES

Sobhani points out that the states that have the most aggressive RPS programs—Nevada, Texas, New York—"have the lion's share of development in the U.S. in the solar market."

In recent years, however, the RPS programs have had less of an impact because solar and wind generation have become increasingly cost-competitive

with carbon-based power.

"The International Renewable Energy Association has stated that 56 percent of new renewable power sources are cheaper than the cheapest form of new coal," says Sobhani. "The proof is in the pudding; if there wasn't cost parity, we would not be seeing this tremendous explosion in renewable development."

One final accelerant for the market is the Biden Administration's stated commitment to achieving net-zero emissions on the power grid by 2035 and economy-wide by 2050.

"We haven't had that overarching policy in the past several years," says Toelke. "More consistent federal policies could be the catalyst that brings it all together."

RAPIDLY IMPROVING TECHNOLOGIES

As much as the renewables market will grow over the coming years, even more so will it change. Not only are solar and wind technologies rapidly improving, but other forms of renewable generation are coming online, and energy storage is becoming mainstream.

"Wind and solar technologies continue to improve every year," says Matthew Thibodeau, senior vice president of consulting services at Sargent & Lundy. "We will continue to see both efficiency and cost improvements."

"On solar photovoltaic panels, we see the price curve continuing to go down," says Skurdahl. "And that provides indirect benefits as well. As wattage goes up, the proportion spent on support systems goes down."

The same is happening on the wind side, he adds. "We're seeing larger capacity factors for wind farms. Larger turbines produce more power, so the price per megawatt of wind projects is lower."

Toelke says when she entered the field in the early 2000s, "it would have been hard to imagine the large turbines we are permitting now." Offshore wind turbines today can generate up to 14 megawatts (MW) of power.

One of the challenges, says Skurdahl, is "a lot of the great wind farm sites have been built already, so where the projects are now is rocky or wet. You might make up some ground by having newer advanced designs going in, but it might cost a lot more money to build and construct on those lands."

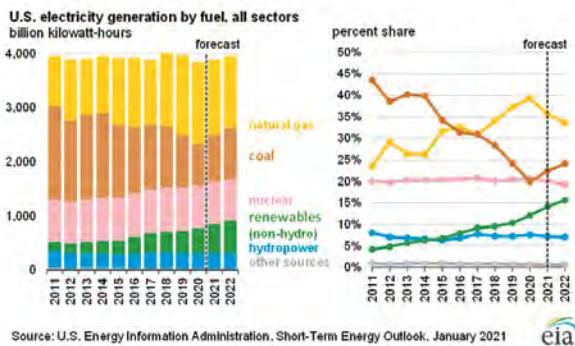
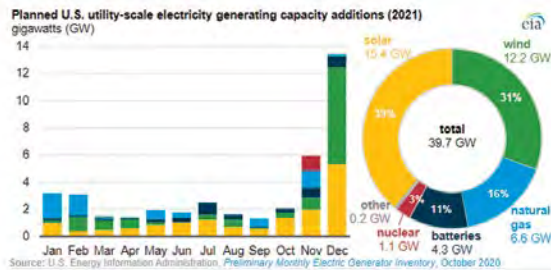
Enter offshore wind projects in the Atlantic Ocean. "We've been



VIONETTA/STOCK/GETTY IMAGES

JANUARY 11, 2021

Renewables account for most new U.S. electricity generating capacity in 2021



hearing since 2005 that offshore wind is going to take off ‘next year,’” says Skurdahl. “Well, I think next year is finally here, and we’re going to see a flood of opportunity and activity in the space.”

Toelke concurs: “I see incredible potential in offshore wind.” Tetra Tech has supported various services and stages with 14 offshore wind projects in the Atlantic and is currently active on eight of them. “It’s one of the most exciting parts in the sector—new leases, new geographies, new technology, and a new frontier.”

Sobhani estimates that there are up to 30 gigawatts (GW) of renewable offshore wind developments slated to go into service by 2030, with New York accounting for 9 GW of the mix and New Jersey responsible for 7.5 GW.

“They are primarily being driven by aggressive legislated milestones for net-zero carbon production,” Sobhani says. “That’s not attainable for those states without offshore wind. They don’t have the real estate available for the kind of solar and onshore wind production they would need to achieve that.”

“These are massive, massive projects,” says Thibodeau. “The Dominion project off Virginia is 2.6 GW, and most of the others are around 800 to 1,300 MW. Getting them developed, financed, and built is a big undertaking.”

He adds that a big part of the work for engineering firms in the offshore wind sector is getting them connected to the grid. “One of the offshore wind projects we have worked on will connect into Long Island,” says Thibodeau. “It’s been quite a challenge figuring out how all that power is going to be integrated because of the difficulty of making grid improvements in New York City and Long Island.”

HERE COMES HYDROGEN

“Hydrogen has taken off in terms of the level of interest in the past 12 to 24 months,” says Thibodeau. “That’s using hydrogen as a fuel, blended with natural gas or burning hydrogen directly, but also using hydrogen as an energy storage medium.”

Most of the work on hydrogen right now focuses on feasibility studies. Sargent & Lundy is undertaking several projects burning a blend of hydrogen and natural gas in existing combustion turbine technology, and Stantec is working with an offshore wind developer.

“There’s a lot of power that can come out of that project, and one of the potential solutions for offtaking that much power is hydrogen production,” says Sobhani. “It’s an efficient way to store energy that demands a high level of mobility.”

While solar and wind will continue to be the big energy generators in the sector for at least the next decade, other renewable technologies, such as waste-to-energy or geothermal, will have a niche in the market. The unknown, of course, will be other technologies that may already be in the R&D stage or are just in some engineer’s musings.

“There will be a lot of creativity going into how the pieces are put together as utilities strive to meet customer demand and renewable goals,” says Shoemaker.

ENERGY STORAGE: THE FINAL PIECE?

“A renewable or carbon-free energy future cannot happen without energy storage as a large component,” says Sobhani. “Without it, it’s not possible to provide consistent, reliable energy output on a 24-hour demand cycle.”

Energy storage has come a long way in a short period. Sobhani calls it “the fastest-growing segment in the energy transition.” The reason behind that growth is that the primary storage technology right now, lithium-ion batteries, has become safer and cheaper. Sobhani estimates that the batteries are “up to 10 times cheaper than 10–12 years ago.”

That increased affordability has led to a surge in renewable energy projects that combine solar or wind with battery storage. “I would expect that 60–70 percent of our solar installations going forward would have batteries,” says Skurdahl. “The world is headed that way, and in the future, utilities and developers will do them with wind projects as well.”

The big drawback right now of lithium-ion batteries is their duration. “When the duration of the energy storage project exceeds four to six hours, a lot of competing technologies come into play,” says Thibodeau. “When you have to store a day’s worth or a week’s worth of energy, utilities are deploying longer-duration technologies, such as liquid-air energy storage, advanced-compressed-air energy storage, or other non-lithium battery technologies.”

“Energy storage companies have really lofty ambitions about cost reduction potential,” he adds. “Some of these are well-capitalized companies, and that space is moving quickly and is going to enable a lot more renewables to come online in the future.” ■

Gerry Donohue is ACEC’s senior communications writer. He can be reached at gdonohue@acec.org.



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Institute Report Confirms Critical Role of Engineering Industry in U.S. Economy

The ACEC Research Institute kicked off 2021 with a first-of-its-kind industry research study: “2020 Engineering Industry Profile,” available to all members. The research report shows the critical role the engineering industry plays in the U.S. economy. We asked about the importance of this research from the people who know it best: ACEC Chair Charlie Gozdziwski, ACEC Research Institute Chair John Carrato, and Jon Gray, principal at Rockport Analytics.

INSTITUTE: WHY IS THIS STUDY SO IMPORTANT TO THE INDUSTRY AND OUR MEMBERS?

Gozdziwski: The engineering industry is critical to the quality of life in this country. We design America’s great infrastructure, including building roads, homes, and buildings, and yet we never quantified it before. This study will help us better understand the size of the sector and what we contribute to the U.S. economy in terms of sales, jobs, taxes, and direct economic impact. Having all this information and data is hugely important to our industry as a whole and to our members.

INSTITUTE: HOW CAN THE FINDINGS FROM THIS STUDY BE USED?

Gozdziwski: The findings can be used in countless ways. We will be able to bring the data showing our impact on the economy to Capitol Hill to use as an advocacy tool. We will be able to provide the information as part of our education efforts. Our members benefit not just by knowing their impact on the industry, but now having the numbers to show it.

INSTITUTE: WHAT DO YOU HOPE IS THE BIGGEST TAKEAWAY FROM THIS RESEARCH?

Carrato: This research is vitally important to our members and our industry. My hope is that this puts the ACEC Research Institute on the path to be an important thought leader in the engineering space and establishes us as the go-to source for industry data. I know we are the leading source of knowledge in this space. It is time for everyone to know it, and I believe this research is the way to get there.

INSTITUTE: WHAT ELSE CAN WE EXPECT IN TERMS OF RESEARCH FROM THE ACEC RESEARCH INSTITUTE?

Carrato: This is the first of three studies that allows us to take a 360-degree look at the industry. The second study focuses on the economic contributions of our industry, and the final study is another groundbreaking study as it provides an industry forecast.

INSTITUTE: HOW DOES THIS STUDY COMPARE TO OTHER INDUSTRIES?

Gray: The engineering, architectural, and surveying services industry is extremely diverse, comprising 36 distinct occupations across eight different subsectors. Engineering activity dominates the sector, however, making up 67 percent of engineering and related design services jobs and around 75 percent of the entire sector's revenue. The sector has grown faster than the broader U.S. economy over the last 15 years, albeit with a bit more volatility. Average wages across engineering and related services occupations are extremely attractive, nearing \$90,000 in the U.S.—46 percent higher than the national average wage of \$60,300.

INSTITUTE: LET'S TALK ABOUT THE INFORMATION YOU USED IN PUTTING THIS STUDY TOGETHER. WHY IS THIS METHODOLOGY IMPORTANT?

Gray: From the outset of the research, we felt it was important to gain the best measures of engineering and architectural services activity as represented by ACEC's constituency. Unfortunately, there is no single source of data that directly deals with this research challenge. We can triangulate a lot of what we are trying to measure, however, by tapping into several different data sources, like Dun & Bradstreet, the Bureau of Economic Analysis' National Income and Product Accounts, the U.S. Census Bureau's Statistics of U.S. Businesses, and other private survey sources, and then make appropriate adjustments based on methodological differences or shortcomings in the data sources.

For more information and to download a copy of the "2020 Engineering Industry Profile," head to the ACEC Research Institute's website at <https://programs.acec.org/impact-report>. ■



ACEC, Coalition Call for Passage of Comprehensive Infrastructure Package by July 4



ACEC has joined with the U.S. Chamber of Commerce, the Bipartisan Policy Center, and more than 80 stakeholders in calling on Congress to pass comprehensive infrastructure legislation by July 4.

The Build by the Fourth of July coalition has highlighted six areas to be included in the legislation.

- Repair and update our crumbling infrastructure
- Stimulate our economy and create middle-class sustaining jobs
- Address climate change
- Promote fiscally and environmentally responsible policies
- Improve federal project approvals
- Address the digital divide

“We need Congress to enact a fiscally and environmentally responsible infrastructure package that stimulates the economy,” reads the statement from the coalition. “As a nation we must be able to build big things promptly to accelerate the economic recovery and build the resilient low-carbon economy of the future. We need a durable commitment and clear strategy.”

Supplemental Transportation Funds Included in Year-End Package

The year-end omnibus and economic relief legislation approved by Congress included much-needed emergency aid to transportation agencies. ACEC had advocated for the supplemental funding to backstop state and local budgets hard hit by the pandemic and avoid drastic cuts resulting from the economic downturn.

The bill provided \$10 billion in highway funding to state departments of transportation (DOT), \$14 billion to local transit agencies, and \$2 billion to airports. The state DOT funding will be distributed by the existing apportionment formula and is available at 100 percent federal cost share with no matching requirement. It may be used for traditional construction activities under the Surface Transportation Block Grant Program, as well as preventive maintenance, routine maintenance, operations, and personnel costs (including employee

and contractor salaries), debt service payments, availability payments, and coverage for other revenue losses.

The transit funding has broad eligibility but is largely directed to cover operating expenses. Funds are distributed according to current program formulas, but when combined with funding from the Coronavirus Aid, Relief, and Economic Security Act, it is capped at 75 percent of an agency's operating costs.

The final funding package also included increased investment in infrastructure programs for the fiscal year 2021 budget. Congress continued the recent trend of supplementing authorized trust fund programs with supplements from the general fund. Highways received \$2 billion above the levels authorized in the Fixing America's Surface Transportation Act; transit programs received \$500 million in additional funding, and airports \$400 million.



Tax Provisions in New Stimulus Law

At the end of December, Congress reached agreement on new legislation to address the ongoing COVID-19 pandemic and related economic impacts. The law, signed on Dec. 27, 2020, includes several key tax provisions.

After months of advocacy, ACEC and a broad business coalition succeeded in persuading Congress to clarify that expenses covered by Paycheck Protection Program (PPP) loan forgiveness are tax deductible, overturning an IRS ruling. The stimulus bill also extended the availability of PPP loans and made it possible for some borrowers to take out a second loan.

ACEC also requested from Congress clarification on the problem posed by the FAR credits clause to firms doing work for state DOTs and other public agencies, which was not included in the final package. The Council is currently

working with lawmakers to include a fix in the next stimulus package.

The legislation renewed and expanded the employee retention tax credit (ERTC) and removed the barrier to PPP borrowers also claiming the ERTC, with guardrails to prevent using these two benefits during the same time period.

In addition to provisions directly related to the economic crisis, Congress extended several expiring tax provisions in the omnibus bill. The legislation made the Section 179D energy-efficient commercial buildings tax deduction permanent, which has been a priority for ACEC. It also extended several tax credits for renewable energy.

Finally, the law makes available through 2025 a provision allowing employers to assist employees with student loan repayment without it being a taxable benefit. These tax extensions were all key lobbying issues during the 2019 ACEC Annual Convention.

ISSUES ON THE MOVE	WHAT'S NEXT
Confirmation of DOT Secretary	Building out leadership with FHWA, FTA, and other subagencies
Infrastructure Agenda	House, Senate action expected to start in February/March time frame

ACEC Backs Buttigieg Nomination for DOT Secretary

The Senate recently approved the nomination of Pete Buttigieg to be the secretary of transportation, a move strongly supported by ACEC.

In advance of Buttigieg's confirmation hearing, ACEC President and CEO Linda Bauer Darr called on the Senate to give his nomination its support.

"With his experience as a mayor, he keenly understands the critical role that transportation plays in a community's economic development, the safety and wellbeing of its citizens, and the health of the environment," Darr wrote. "He is well equipped to lead the Department of Transportation at this important time in our history."

Key Water and Energy Priorities Included in Year-End Package

The COVID relief and fiscal year 2021 appropriations package included long-advocated ACEC water, energy, and environmental policy priorities.

The package contains extensive provisions supporting research, development, and demonstration of a wide range of next-generation technologies to keep energy affordable, reliable, and clean across various sectors, including electric power, industry, and buildings.

Among technologies included and specifically supported by ACEC were energy storage; advanced nuclear; carbon capture, utilization, and storage; carbon removal; a range of renewable energy; and grid modernization.

The year-end bill also included environmental technology support for carbon capture, utilization, and sequestration, including direct air capture. The Utilizing Significant Emissions With Innovative Technologies Act supports technology opportunities to economically use fossil fuels with little or no emissions of carbon.

Finally, the omnibus included the Water Resources and Development Act of 2020, which authorized nearly \$10 billion in new U.S. Army Corps of Engineers water projects. This provision reflects the continued bipartisan commitment to routinely authorize federal investments in water infrastructure projects developed, constructed, and maintained by the Army Corps essential to competitiveness, navigation, and flood protection.

Though the water, energy, and environmental legislation enacted was a major accomplishment, challenges remain, including water supply and wastewater and stormwater infrastructure policy to advance project funding, regulatory flexibility, flood and drought resilience, and technology innovation, such as emerging contaminants.

As the new administration and Congress begins, ACEC will be engaged on COVID relief, economic recovery, climate change, and other policy initiatives to advance ACEC's water, energy, and environment advocacy goals.

For More News

For legislative news, visit ACEC's *Last Word* blog online at www.acec.org.



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Innovation Districts: Key in Post-COVID Economy

By Erin McLaughlin

Innovation districts are increasingly important development tools for universities in a post-COVID-19 economy, as the collaborative partnerships resulting from the districts provide new sources of funding. Referred to in a 2014 Brookings Institution paper as a “new complementary urban model” that was “now emerging,” innovation districts have now emerged and are hotter than ever.

These developments aim to be hubs for startup and technology-focused companies looking to partner with universities to develop new research—generally in science, technology, engineering, and math-related fields. According to Brookings’ “The Rise of Innovation Districts: A New Geography of Innovation in America” (2014), they are also “physically compact, transit accessible, and technically wired, and offer mixed-use housing, office, and retail.” In particular, urban universities value the unique opportunity innovation districts represent and are working with businesses, local governments, and community stakeholders to reshape urban real estate and create buzzworthy adjacent or satellite campuses.

In every major American city, universities play a key role beyond the mission of education and research. Urban universities are increasingly anchor institutions of metropolitan regions, with ownership of significant real estate. Universities rank as the largest employers in two-thirds of America’s 100 largest cities, as detailed in Curbed (“Universities, Chasing the Startup Economy, Reshape Urban Real Estate,” 2018). Even in New York City—a global capital of business—universities and academic medical centers make up five of the top 10 private employers, according to Slate (“City Planning 101: Why Universities Became Big-Time Real Estate Developers,” 2018). Fulfilling a role as a real estate developer is not new for universities—many have been engaging in substantial urban redevelopment since the 1990s, mainly because they needed safe and attractive campuses. However, the reasons why universities are developing innovation districts is different.

For universities, innovation districts create funding streams through the innovation hubs and corresponding partnerships and research endeavors. Scott Andes, executive director of the Block Center for Technology and Society at Carnegie Mellon University’s Heinz College, led a Brookings Institution study titled “Hidden in Plain Sight: The Oversized Impact of Downtown Universities” (2017) and found that urban research universities are economic development engines for this innovation hub activity due largely to the patents and licensing deals that result from the research. Andes detailed how urban

universities in particular thrive under this model: “These institutions were responsible for 37 percent of startups and patents, 43 percent of invention disclosures, and 52 percent of licensing income.” The economic benefit of the patent, according to Andes, is not the end goal for the university; it is the income from licensing deals that result from the contractual relationship a university forms with a firm that allows that firm to use (not own) the patented technology.

Shifts in the economy and in revenue streams—made even more dire during COVID-19—have left many universities seeking such financial partners. Universities were already feeling tapped out pre-pandemic—especially public universities, which have seen tightening budgets due to loss of tax revenue during the current recession. That need has driven universities to turn to startups and tech firms, which have become larger forces in urban economies.

“Universities have always made money off the research products of their faculty—that’s not new,” Sharon Haar, a professor of architecture at the University of Michigan and author of *The City as Campus*, says in the Curbed article. “But increasingly, the need to monetize research has come to the fore in a way that it wasn’t in the past.”

The corresponding partnerships between the two—which are physically manifested and organized around the creation of the innovation districts—have helped universities see the fruits of their research labor and stay relevant in a quickly evolving tech scene. These partnerships at campuses nationwide have also decentralized technology and startup activities that were at one time only seen as possible in Silicon Valley. The accompanying table details some innovation districts in the early stages of development.



Harvard University, Cambridge and Allston, Mass.

Project: Enterprise Research Campus

Scope/Time Frame: 36-acre urban development adjacent to Harvard's new Science and Engineering Complex, with plans for a mix of research-focused companies, green space, residential space, a hotel, and a conference center. It is in the early stages of development, with a commercial real estate partner chosen in 2019.

Link: <http://bit.do/Harvard-Enterprise-Research-Campus>

Drexel University, Philadelphia

Project: Schuylkill Yards

Scope/Time Frame: 5 million square feet of entrepreneurial spaces, teaching and research facilities, corporate offices, residential and retail development, and hospitality and cultural venues. A public benefit is a new 1.3-acre green space, which was the first piece to open in 2019, called Drexel Square. The project was announced in 2016 and is estimated to be completed by 2036.

Link: <http://bit.do/Drexel-Schuylkill-Yards>

Arizona State University (ASU), Phoenix

Project: PBC Innovation Center at the Phoenix Biomedical Campus

Scope/Time Frame: ASU is responsible for a 7-acre parcel on the city's new and developing 30-acre biomedical campus. Ground was broken on the first building in 2019, a 225,000-square-foot space to be leased half by ASU and the other half by private companies. The entire ASU parcel is planned for 1.8 million square feet, targeting clinical research that focuses on health, wellness, and nutrition.

Link: <http://bit.do/Arizona-PBC-Innovation-Center>

Johns Hopkins University (JHU), Baltimore

Project: Science + Technology Park within Eager Park, also referred to as the East Baltimore Development Initiative

Scope/Time Frame: JHU is leading an incredibly ambitious multi-decade plan (begun in 2002) to revitalize 88 acres in severely depressed East Baltimore with a new life sciences hub that hopes to rival those around Harvard and MIT. The project involves tearing down much of a distressed neighborhood, relocating 740 families, and then inviting them to return to the revitalized area.

Link: <http://bit.do/Johns-Hopkins-Science-and-Tech-Park>



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Public-Private Partnerships (P3s)

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It Is Not Just a Recession—It Is a 'Shecession'

One has to do a double take when reading headlines like, "The U.S. Economy Lost 140,000 Jobs in December. All of Them Were Held by Women" (CNN.com, Jan. 8, 2021). Could that be right? The unfortunate answer is yes.

The COVID-19 recession has not affected everyone the same—and it has been particularly bad for U.S. women. When the Bureau of Labor Statistics (BLS) released its monthly job numbers for December, it showed that for the first time, jobs held by women disappeared at a faster clip than those held by men. December was also notable as it was the first time since April 2020 that the U.S. economy stopped adding jobs and instead shed them. According to BLS, the country lost a net 140,000 payroll jobs in December, due to 156,000 women losing their jobs and men gaining 16,000 jobs. The only other month there had been such a drastic dip was September, when 865,000 women left the labor force—four times the rate of men. Many blamed the start of the virtual school year for the September decline.

This meshes with the research the Bipartisan Policy Center (BPC) has done on the subject. In its "Impact of COVID-19 on the Workforce" survey conducted in October 2020, BPC details that among women with children under 2 years old, 42 percent have left work during the coronavirus pandemic, and women were twice as likely as men to say they left work for caregiving responsibilities due to child care provider or school closures.

For the engineering industry—which has collectively worked to incorporate women and other under-represented groups fully into its workforce—understanding and being aware of these challenges is key. ■



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THE ENGINEERING FIRM OF THE

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TECHNOLOGY, CHANGING ATTITUDES, AND THE PANDEMIC ARE RESHAPING



SOCIETY—AND TRANSFORMING ENGINEERING FIRMS **BY SAMUEL GREENGARD**

METAKORNS/GETTY IMAGES

Engineers have always been adept at evolving with the world around them. But nowadays, rapidly developing technologies, the pandemic, and societal unrest have caused intense disruption in a remarkably short time frame.

“The rate of change in our industry is greater than at any time in our history,” says Peter DiMaggio, co-CEO of Thornton Tomasetti.

“We are at a major inflection point in terms of design and construction,” adds Walter Mehl Jr., managing partner at Jaros, Baum & Bolles.

This transformation will no doubt accelerate in the years ahead—and in doing so, reshape operations and best practices of engineering firms, domestically and throughout the world.

“There’s a need for a far deeper understanding and appreciation for how digital technology, COVID-19, and other factors impact spaces and interactions,” says Kate Wittels, partner at HR&A Advisors, a real estate and economic development consultancy.

For engineering firms, that impact will bring new markets, opportunities, and risks.

DIGITAL RULES

Even before COVID-19 disrupted almost every aspect of our lives, digital technology had made its imprint on engineering. Firms had embraced cloud, mobility, collaboration tools, the Internet of Things (IoT), and building information modeling systems.

“In many ways, the pandemic has simply accelerated trends that were already taking place,” Wittels says. “There’s a blurring process taking place that involves how and where people work.”

Even after the pandemic subsides, it is clear that many of the changes it prompted will remain. As the legions of newly remote workers quickly realized, when you can hold meetings online, share documents and designs, and smoothly manage processes



and workflows without being in the same building, it is easy to imagine operating without the costs associated with leasing space and building out offices. The barriers to transformation are now more cultural than technical or practical. “The pandemic has opened our eyes to what technology can do for firms, both in terms of how firms support their clients on projects as well as how firms support their own personnel’s new workspace and work style preferences,” Mehl says.

At AKF Group, for example, a team uses a GPS-guided scanning system to capture progress at different job sites. “We’re able to view entire floors, buildings, campuses, and other sites, and show staff and clients a time-lapse presentation,” says Dino DeFeo, managing partner at AKF Group. “Our scanning technology enables us to minimize on-site personnel during design

10 TECHNOLOGIES TO WATCH OVER THE NEXT 10 YEARS



3D PRINTING AND FABRICATION:

Components in buildings and other infrastructure are increasingly printed on demand.



ANALYTICS AND MACHINE LEARNING:

Data is at the center of more efficient business operations, buildings, smart cities, and more. Machine learning finds patterns that might otherwise escape the human eye.



AUGMENTED, VIRTUAL, AND MIXED REALITY:

This set of technologies is already in use but promises to revolutionize many engineering processes in the years ahead.



COMPUTER VISION:

Image recognition, powered by artificial intelligence, will impact everything from smart cities to cybersecurity.



DIGITAL TWINS:

These virtual representations of machines, assets, and systems can be used for sophisticated analysis, modeling, and simulations.



METAMORPHOSIS/GETTY IMAGES

and inspection phases. It allows us to use our time more effectively, delivering a tremendous value for our clients.”

At Thornton Tomasetti, drones with cameras capture images

that are fed through machine learning algorithms. This allows engineers to determine which structural weaknesses need to be prioritized. “It’s possible to make highly informed decisions about risks and costs,” DiMaggio says.

Indeed, today’s Zoom meetings, Slack interactions, and Microsoft Teams groups will likely evolve into tomorrow’s virtual workspaces. While it is already possible to review designs and 3D models online, virtual collaboration tools are taking the concept to the next level. Teams can share robust graphics through mixed reality tools, such as the Microsoft HoloLens and immersive virtual reality headsets. Through these tools, participants can view avatars, manipulate 3D objects, such as a building, and attend workshops and expos.

BUILDING ON TECHNOLOGY

The engineering firm of the future will undoubtedly embrace tools that support remote and distributed work. But it will also have to ratchet up expertise in artificial intelligence (AI), robotics, 3D printing, IoT, data science, cybersecurity, and data privacy. Smart buildings, smart systems, and smart cities and infrastructure—along with pandemic risks and sustainability issues—will profoundly change designs, engineering, and public spaces. “Firms must think about how to continually reinvent themselves and the services they deliver,” DiMaggio says.



“We have come to understand that where you’re at as a firm today will likely be very different than where you need to be in six months or a year. You must have the underlying creative and technical foundation in place to adapt and innovate.”

PETER DIMAGGIO
CO-CEO
THORNTON TOMASETTI



INTERNET OF THINGS:

Connected devices are already here. In the future, they likely will be part of every project.



5G:

5G cellular technology offers faster and better ways to connect people and devices.



ROBOTICS:

Autonomous robots will become a fixture in buildings, hotels, and construction sites.



SPEECH RECOGNITION:

Smarter and better voice interfaces are likely to be embedded in buildings and machines.



VIRTUAL COLLABORATION TOOLS:

These systems can create robust interaction, sometimes with the physical world, on devices, and in immersive virtual environments.

DiMaggio points out that just a decade ago, engineers focused on finding the most cost-effective way to design a building or other projects. “It was all about material costs and labor,” he says. “Now the focus is on how we can build, renovate, or retrofit, and minimize the carbon used to construct and operate the building. We have tools that allow us to explore materials, heights, shapes, and designs. We can do an incredible amount of predictive modeling and data analytics. We can understand the life cycle costs and the social costs and make better decisions based on a more complete array of factors.”

As digital technology advances, buildings, workspaces, and infrastructure will continue to evolve. For example, buildings in areas with a temperate climate may include both indoor and outdoor spaces, as well as convertible spaces that increase natural air and light. “A roof or walls might retract, or change, based on the weather,” Wittels says. This would allow a building to reduce HVAC usage, reduce recirculated air, minimize its carbon footprint, and even diminish the risk of viruses being transmitted through close interpersonal contact. No less important: It would likely be appealing to workers. “We may also see this type of thinking applied to shopping, dining, and other activities,” she says.

Likewise, new and different types of interfaces will gain prominence. These include touchless surfaces that replace buttons on elevators, doors, and other systems, as well as apps that allow smartphones to operate rooms, lighting, and buildings. Voice biometrics and tokens on smartphones or watches could control lights, elevators, and access to spaces. And expect a greater use of robots to handle cleaning and maintenance tasks, UV lighting to help sanitize spaces, and doors and bathroom fixtures that are zero touch.

Other emerging trends could prove even more revolutionary. “Digital twins are part of the future of engineering,” DiMaggio says. These systems create representations of physical objects and equipment inside a computer. This can include digital duplicates of real-world buildings, levees, docks, bridges, tunnels, existing facades, and energy systems. The real-time data collected from these systems, especially when fed through machine learning programs, can aid in preventive maintenance and inform future designs.

What’s the big takeaway for engineering firms? To survive in today’s environment, you need to understand digital technology at a deep and broad level, including how to design and build more advanced systems with networks of sensors, IoT devices, and AI. This includes a strong grasp on how to leverage data for tasks as diverse as operating a building or feeding smart utility grids. Yet, it is also critical to understand the social underpinnings of engineering, including how pandemics and sustainability factor into everything from technologies to designs.

DESIGNING THE FUTURE

As the world advances, engineering will most assuredly adapt and continuously innovate. As a result, there’s a growing requirement for expertise that transcends traditional engineering roles and expertise. This includes technologists, data scientists, cybersecurity specialists, and even anthropologists and psychologists who can build bridges between digital technology and people—and spot new and emerging markets. There is also growing



“Our scanning technology enables us to minimize on-site personnel during design and inspection phases.

It allows us to use our time more effectively, delivering a tremendous value for our clients.”

DINO DeFeo
MANAGING PARTNER
AKF GROUP

demand for app designers, software developers, and experts in machine learning and other specialized domains, including 3D printing and fabrication.

Thornton Tomasetti, for one, has established various groups that focus on strategic planning. This includes a sustainability group and an internal research and development group called CORE, which serves as an incubator and studies how to mesh technology with social factors for better design and engineering. A practicing structural engineer heads the group, which includes data scientists, coders, and software specialists.

“We have come to understand that where you’re at as a firm today will likely be very different than where you need to be in six months or a year,” DiMaggio says. “You must have the underlying creative and technical foundation in place to adapt and innovate.”

At AKF Group, executives and teams track technologies and trends on an ongoing basis. Several years ago, the firm established a smart building technology team to oversee various functions, including complex building scans that the firm and clients can share online to track the progress of a project without visiting the site. “A deep understanding of human factors and how the technology can aid in achieving goals is critical,” DeFeo says. “Engineering firms must move beyond ‘bricks and sticks’ thinking in order to be relevant and solve complex engineering puzzles.”

In the end, adapting to the future does not have to be abrupt or traumatic. It also does not have to devolve into a scramble to keep up with constantly changing technology, trends, and conditions—as well as new and emerging markets.

“The key to navigating a changing business environment is to build a strategic framework and have the right expertise available to handle whatever comes along,” DeFeo says. “Ultimately, you have to think of your firm as a technology company and consider it a core function of design and development.” ■

Samuel Greengard is a technology writer based in West Linn, Oregon.

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CLEAR

Before 2015, the 5,000 or so chemicals known as per- and poly-fluoroalkyl substances (PFAS) flew under the radar. Engineers and scientists in both private and public sectors had learned that exposure to PFAS could lead to adverse health effects and were working to mitigate them, but it was quiet work.

“We knew there was contamination and we were developing effective treatment technologies, but we had no idea of the extent to which awareness of PFAS would explode,” says Kent Sorenson Jr., Ph.D., senior vice president at CDM Smith, Inc. “The growth in the treatment market has been exponential.”

PFAS are synthetic compounds that were developed in the 1940s to produce fluoropolymers, such as Teflon. A subgroup of PFAS, including perfluorooctanesulfonic acid (PFOS) and perfluorooctanoic acid (PFOA), was developed for water and lipid resistance. These two compounds were used extensively for consumer products (carpets, clothing, and furniture fabrics, for example), industrial applications, and fire-retarding foam.

The primary issue with PFAS compounds is their synthesized resilience. They have been dubbed “forever chemicals.” Most PFASs have a half-life within the human body in the four-to-five-year range and some extend to seven to 10 years, though their half-life in the environment is much longer. Due to the compounds’ resilience and pervasiveness, they have found their way into humans through the consumption of food or food packaging that contains PFAS due to bioaccumulation and crop uptake as well as the drinking of contaminated water and indoor environmental exposure, such as sofa and rug coatings and non-wrinkle clothing. According

MEMBER FIRMS TAKE THE LEAD IN PFAS TESTING AND REMEDIATION

BY GERRY DONOHUE



ORINOCO-ART/GETTY IMAGES

to the U.S. Environmental Protection Agency (EPA), nearly every American has PFAS in their blood, although those levels have declined in recent years due to the end of large-scale manufacture and use of the chemicals.

PUBLIC OUTCRY

Beginning in the 1990s, research revealed a host of potential human health problems due to PFOS and PFOA, including cancer, liver damage, immunological impacts, thyroid disease, and pregnancy/developmental problems. As a result, all U.S. manufacturers agreed to phase out the manufacture of the chemicals by 2015, although limited amounts are still imported for specific uses. But by then it was too late. Even though the chemicals were now pervasive in the environment, especially around high-use areas such as military facilities, airports, landfills, and certain manufacturing sites, most Americans had never heard of them.

Two main events brought the PFAS market to the fore. In 2016, the EPA released a provisional health advisory, proposing a 70-parts-per-trillion (ppt)

standard for PFOS and PFOA in drinking water. This elevated the awareness of the potential adverse health effects of these compounds. And then in 2015, the Flint, Michigan, water crisis erupted. While this was related to lead contamination, the American public was suddenly aware that their drinking water was not as safe as they thought it was, and they demanded action.

"This market increase has largely been driven by public opinion," says Ward Swanson, vice president and senior environmental scientist at Barr Engineering Co. "Where PFAS have been discovered in drinking water, there has been a strong public outcry, and most regulators have responded quickly and strongly."

Not long after Flint, PFAS compounds were found in drinking water wells in Michigan, New York, California, Colorado, Vermont, and many other states.

Populations close to facilities that made or used PFAS have had the highest levels of exposure. In Hoosick Falls, New York, for example, testing in 2015 at a plastics manufacturing facility found PFOA levels as high as 18,000 ppt in the groundwater, and the town's public water supply contained more than 600 ppt.

Distance from high-use areas, however, does not necessarily confer protection. "There are many groundwaters that have been tested and show no detectable levels," says Jean Debroux, Ph.D., chief technology officer at Kennedy Jenks. "But PFAS are very mobile in groundwater, and it is highly likely that there are undiscovered plumes in groundwater that we will find and that will continue to move and expand over time."

STATES TAKE ACTION

A remarkable characteristic of the PFAS crisis has been the lack of federal leadership. Although a 2018 estimate put the number of contaminated sites nationwide at 26,000 and the number of at-risk Americans at more than 6 million, the federal response has been limited to the 2016 EPA health advisory, which sets a guideline of 70 ppt for PFOS and/or PFOA in drinking water, and a 2019 EPA Action Plan, which essentially says it intends to do something.

Faced with a mushrooming environmental crisis, states have had to act on their own. Many follow the federal 70-ppt standard, but some have adopted more stringent levels. Additionally, while most states have focused on PFOS and PFOA, a few have also regulated other PFAS compounds. Michigan, for example, has implemented a 16-ppt PFOS standard and an 8-ppt PFOA standard, and regulates five additional compounds.

"Once the states started to regulate and require sampling and



The Santa Clarita Valley Water Agency's new site near the William S Hart baseball and softball field in California was fast-tracked to treat 6,000 gallons per minute of PFAS-contaminated groundwater.

analysis, the market just took off," says Debroux. "If water purveyors had a positive test, they needed the remediation projects to be done or they couldn't sell their water."

PFAS mitigation is as much science as engineering, requiring upfront significant data collection and lab work.

"We use the term PFAS a lot, but with that comprising maybe 5,000 chemicals, when someone says they have a contaminated site, what does that mean?" Sorenson asks. "First, we have to understand the problem. What was the source? What are the constituents? Which compounds are we dealing with? Because they often require different treatments, and if you don't get that right, you can inadvertently make the problem worse."

Measuring in ppt adds another level of complexity. "Parts per trillion is so very low that when you're working on-site, you always have to be conscious of contaminating your samples," says Swanson. "And then there are other issues, such as matrix diffusion (in which the contaminants penetrate into the surrounding clay or silt and slowly release into the groundwater over time). At these low levels, this diffusion can show concentrations above action levels for a long period of time and can make source identification, and fate and transport modeling more difficult."

Even the water plays a part. "You may be successfully using a remediation method, such as granular activated carbon, in one groundwater basin," says Debroux, "but then you move over to



"Once the states started to regulate and require sampling and analysis, the market just took off. If water purveyors had a positive test, they needed the remediation projects to be done or they couldn't sell their water."

JEAN DEBROUX, PH.D.
CHIEF TECHNOLOGY OFFICER
KENNEDY JENKS

the next basin, and suddenly that methodology is not nearly as efficient because the water quality is different.”

MAKING BIG STRIDES

As the market has grown, firms have become better at testing, detection, and remediation. “The science is moving rapidly worldwide and in a complementary way,” says Sorenson. “In Australia, they were very quick to establish widespread regulations, and they got out front with looking at ecological impacts in addition to human health impacts. In the U.S., and to some extent in Europe, we have been leading the way on various treatment technologies.”

Depending on the compound to be treated, firms may use ion exchange, granular activated carbon, reverse osmosis membrane filtration, or other technologies.

In the early days, the focus was on small-scale remediation projects, such as treating individual wells. As the awareness of the contamination has grown, so have the projects. Firms are now building centralized treatment facilities. In January 2020, for example, the Kennedy Jenks-designed Ponders Wellsite treatment plant in Lakewood, Washington, came online, treating 2,000 gallons of groundwater per minute.

Additionally, while the primary focus from the start has been on PFAS in drinking water, states and municipalities are looking

There are an
estimated
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Americans at risk

at other pathways, including landfills and biosolids, especially those that are applied to the land and work their way into both domesticated and wild animals.

As more and more states move to test and regulate PFAS, the testing and remediation markets will continue to grow. Additionally, Debrox anticipates that states will gradually expand the number of regulated contaminants. “Potentially, we might see as many as 12 compounds as more toxicological information comes out,” he says.

This patchwork approach will likely continue for the next few years, but at some point, the EPA will issue federal PFAS regulations. “I don’t see it coming in the near future,” says Debrox.

When it does, though, these engineers agree it will be a game-changer.

“The market is still on the upswing, as more and more states are promulgating regulatory standards, but eventually we’ll reach a point when all the states that are going to do something on their own will have done it,” says Sorenson. “The market will plateau until we get federal regulations, and then it will take off again.” ■

Gerry Donohue is ACEC’s senior communications writer. He can be reached at gdonohue@acec.org.



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**EMPIRE STATE PLAZA,
ALBANY, NEW YORK**

BY CALVIN HENNICK

CELEBRATING ITS 100TH ANNIVERSARY, ONE OF ACEC'S LARGEST STATE MEMBER ORGANIZATIONS DIVERSIFIED AND SHIFTED TO ADVOCACY AND EDUCATION TO BETTER SERVE CONSULTING ENGINEERS IN THE EMPIRE STATE

W

hen Orrin “Mac” MacMurray, chairman emeritus of C&S Companies and a former board chair of one of the ACEC New York predecessor organizations, the Consulting Engineers Council of New York State, and ACEC National, got involved with the

Member Organization in the mid-1980s, it was something of an old boys’ club.

“The first meeting I went to, I brought my wife along, because I was told that was common,” MacMurray recalls. “We went to the social function, and CEOs of four or five firms from around the state were playing music, and another one got up and sang. It was almost like a family. It was mostly World War II and Korean War veterans, self-made men—very few women—and they viewed the organization not only as a place to share what was going on and talk about business issues, but every bit as much a place to socialize. It was: Let’s have a drink, let’s have dinner, let’s have fun.”

Much has changed in the intervening decades. Rather than a collection of firm owners and chief executives, the Member Organization today comprises employees from throughout the firms it represents. It has evolved to become a unified, powerful voice to advocate for the industry. And while there is still camaraderie among members, golf outings and group vacations have largely given way to a wealth of valuable programming that helps members improve their understanding of the business of engineering.

“The earlier organization wasn’t as focused on advocacy or on education,” MacMurray says. “Fast-forward to today, and we have an organization that is much more business-oriented, much more focused on legislation, training, advocacy—the kinds of things that are really important to engineering firms today. Also, the membership is much more diverse, and it goes deeper into the Member Firms than before.”

OUT OF MANY, ONE

Today’s ACEC New York is the result of a century’s worth of work by countless consulting engineers who belonged to several groups that all came together just over 20 years ago. First, the New York Association of Consulting Engineers was formed in New York City in 1921. Then, in 1957, the Consulting



“We all have a basic common goal: to advocate for the interests of the business of engineering.”

JAY SIMSON
PRESIDENT AND CEO
ACEC NEW YORK

Engineers Council of New York State was formed, with seven regional chapters throughout the Empire State. Finally, in 2000, the metro and upstate organizations merged to form the American Council of Engineering Companies of New York (ACEC New York), the second largest ACEC Member Organization in the ACEC National federation. The merger brought not only strength in numbers but also a unity of mission: giving the state’s consulting engineers the ability to speak with one voice on issues of importance to the industry.

“We all have a basic common goal: to advocate for the interests of the business of engineering,” says Jay Simson, president and CEO of ACEC New York. “I think our members have always seen the value of a business association. There’s an amazing culture of involvement; we even have waitlists for people to get on committees.”

Simson was the leader of the upstate group when it merged with the New York City organization, and he will retire this year after 29 years at the helm. During nearly three decades, Simson has been a passionate evangelist for the Member Organization, and one gets the sense that he is not entirely joking when he says, “Of course, we are the best.” He adds, “We try to set the standard for volunteerism, leadership, and ethics in everything we do.”

Katherine Dewkett, associate vice president at Dewberry and a longtime member and past chair of ACEC New York, credits Simson for not only seamlessly bringing together the two groups but also growing programming to meet the needs of engineers in the state.

“When the groups merged, the leader of the New York City organization retired after decades, and Jay had some big shoes to

fill,” Dewkett says. “Anytime you take over an organization that someone has been running for a long time—and someone who is really well liked—it’s difficult. But look at how much it’s grown. It’s a big difference from when it was just Jay and one other staffer. It’s just incredible how the programs have grown over the last 30 years.”

Dewkett points to the state’s Winter Conference.



John F. Hennessy III (pictured at the 34th ACEC New York Engineering Excellence Awards event) was the first chair of the statewide ACEC New York organization in 2000–2001, chair of the Metro Region in 2002–2004, and ACEC National chair in 2008–2009. Hennessy III had a legacy with ACEC New York: His father, John F. Hennessy Jr., was president of the predecessor organization (NYACE) in 1959, and his grandfather, John F. Hennessy, one of the founders of long-standing Member Firm Syska Hennessy, was president in 1951. Sadly, Hennessy III passed away on Feb. 21, 2021, at the age of 65. He was a leader in the engineering profession and the building industry and set a high bar with his volunteerism, as did his father and grandfather before him. His impact on ACEC New York and other industry organizations will long be remembered.



**NIAGARA
FALLS**

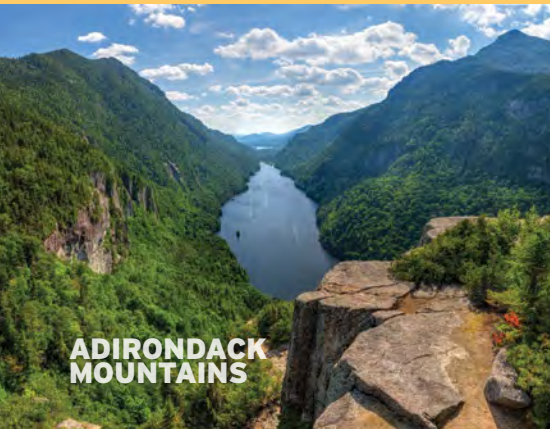


NEW YORK CITY

ACEC NEW YORK AT A GLANCE

ACEC New York's membership includes over 200 engineering firms representing more than 20,000 employees, as well as 80 affiliate member companies. The state Member Organization was founded in 1921.

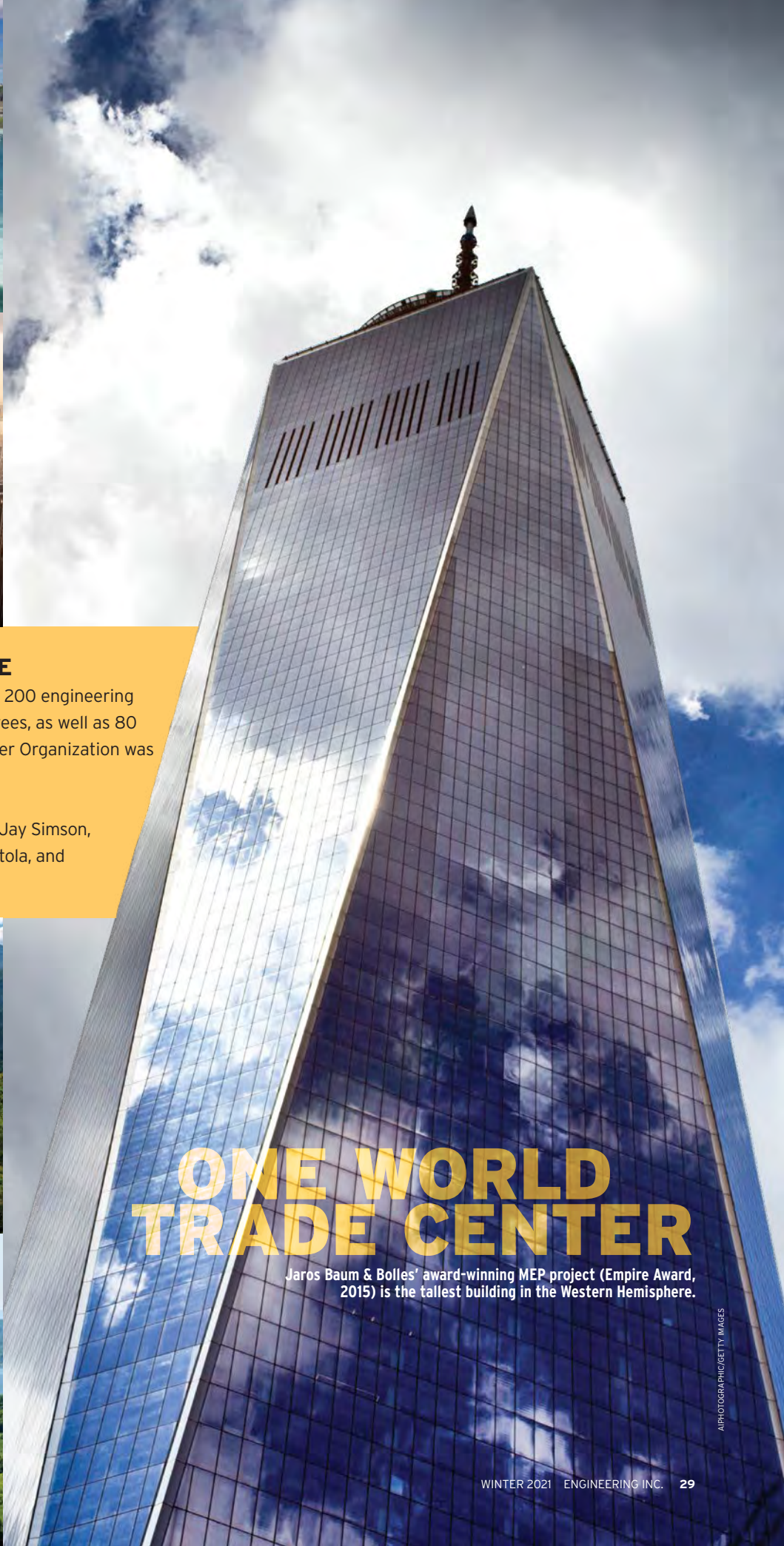
ACEC New York is led by President and CEO Jay Simson, Chair Raymond Daddazio, Chair-elect Rick Zottola, and National Director Thomas Cascino.



**ADIRONDACK
MOUNTAINS**



**HUDSON
RIVER
VALLEY**



ONE WORLD TRADE CENTER

Jaros Baum & Bolles' award-winning MEP project (Empire Award, 2015) is the tallest building in the Western Hemisphere.

GETTY IMAGES

ALPHOTOGRAPHIC/GETTY IMAGES

Years ago, the event drew about 100 people, with a few state agencies represented. Today, the event gathers more than 400 engineers from around the state, along with representatives from a plethora of state and city agencies.

"I think Jay has done an outstanding job," MacMurray says. "He's built the staff. He's put into place policies and procedures. And he has really created and built a government advocacy and regulatory advocacy effort for the organization. He's had a tremendous impact."

THRIVING DURING CRISIS

The Member Organization has retained 85 percent to 90 percent of its membership during the COVID crisis—an even higher retention rate than the previous year, according to Gina Potfora, vice president of member services for ACEC New York. She credits that success to an aggressive pivot to meet engineers' needs remotely.

"We are ecstatic that our Member Firms have seen us as a good, sound investment," Potfora says. "We are doing recruitment, but more than that, we're just making sure our base is finding the value and the support they need from us at this time. Everything is online. Our leadership academy is an all-day course, and we had to make sure that our platform, our



"If there's a firm that has never done business with a certain agency, they can learn about how to make an introduction and then develop a relationship."

GINA POTFORA
VICE PRESIDENT OF MEMBER SERVICES
ACEC NEW YORK

technology, and our people delivered that program in a way that was as beneficial to members as possible. Our surveys are coming back very positive."

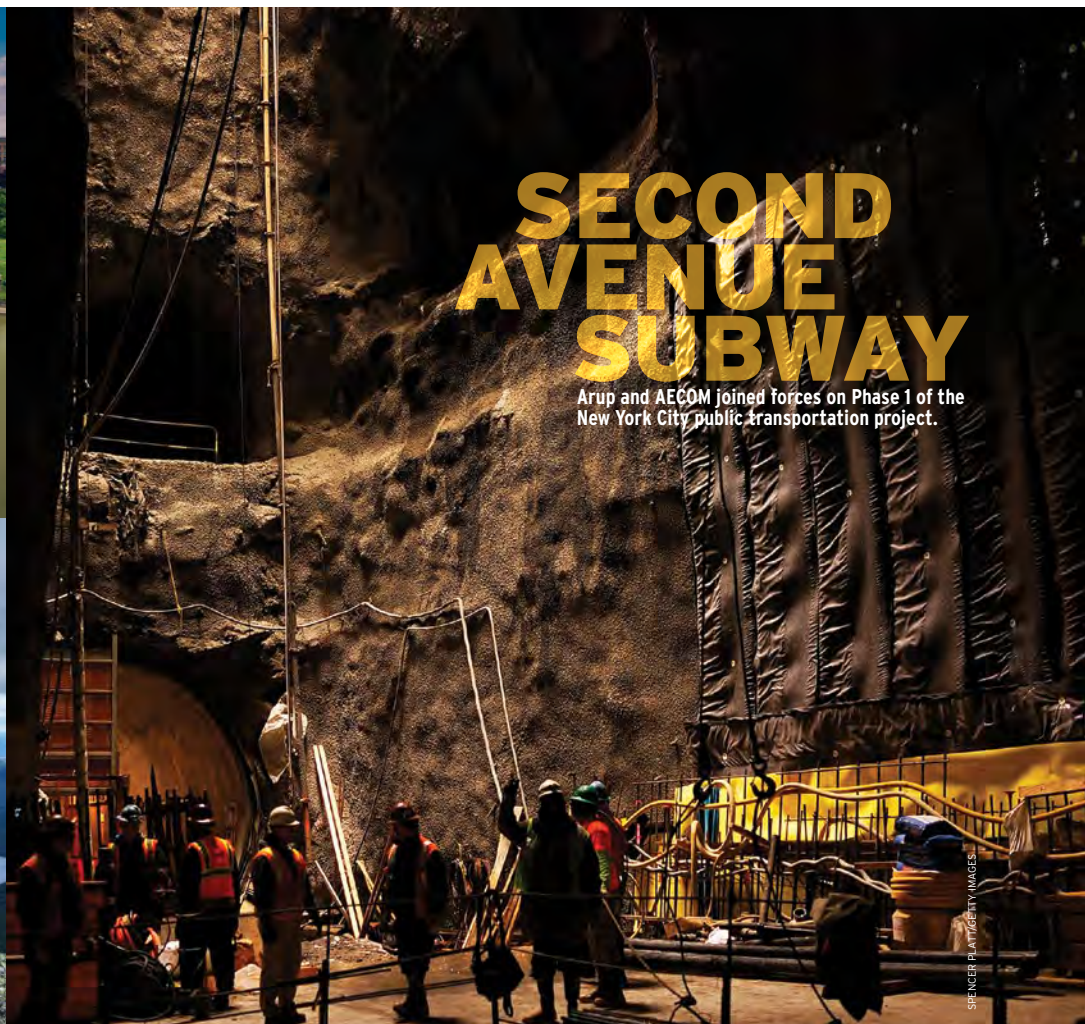
In Potfora's experience, firms join ACEC New York—and stay—for a combination of the group's education programming, advocacy efforts, and networking opportunities. In addition to the organization's leadership academy, ACEC New York provides



HIGH FALLS



LAKE PLACID



SECOND AVENUE SUBWAY

Arup and AECOM joined forces on Phase 1 of the New York City public transportation project.

SPENCER PLATT/GETTY IMAGES

workshops and webinars to help engineers stay up to date with licensing requirements and industry trends. Although the social dynamic may not be as dominant as it once was, relationships and connections continue to yield positive business outcomes for members.

"If there's a firm that has never done business with a certain agency, they can learn about how to make an introduction and then develop a relationship," Potfora says. "Firms run across issues in the industry, and they can reach out to their competitors and say, 'Have you ever encountered this?' I see that all the time in our committee work."

Some engineers become active in ACEC New York with an eye on moving up the leadership ranks within large organizations, Dewkett says. That sort of career advancement requires an understanding not only of the technical aspects of engineering, but also of the business side of the industry. "That's not something that we, as engineers, generally come out of school understanding," she notes.

PURSUING LEGISLATIVE PRIORITIES

ACEC New York is tasked with representing its members' interests in the state's capital, Albany. Perhaps the greatest legislative victory of Simson's tenure was the loosening of a law that prohibited nonlicensed engineers from claiming an ownership stake in engineering companies. The law was a relic of a time when engineering firms were largely run by sole proprietors, and it previously prohibited stakeholders such as CFOs and lab managers from owning a portion of their firms unless they were licensed engineers.

After extensive lobbying by ACEC New York, the state now allows up to 25 percent of engineering firms to be owned by people without an engineering license. The Member Organization continues to fight to lift that cap, which would open up new opportunities for employee stock ownership plans. Last year, ACEC New York saw further progress on its goal to expand ownership flexibility as legislation to allow greater participation by Employee Stock Ownership Plans passed the state Senate. The Member Organization redoubled its lobbying efforts to see the bill pass both houses this session and continue the modernization of the state's ownership rules.



"We have an organization that is much more business-focused, much more focused on legislation, training, advocacy—the kinds of things that are really important to engineering firms today."

ORRIN "MAC" MACMURRAY
FORMER BOARD CHAIR
CONSULTING ENGINEERS COUNCIL OF NEW YORK STATE

Annual contributions to ACEC New York's political action committee have topped \$90,000

"We have strong support from our membership and also in both houses of the legislature. There has been a recent groundswell of support for [employee stock ownership plans] and other employee ownership plans in New York, including policy papers authored by current high-level policymakers. We think we are well positioned to take advantage of this momentum and deliver a real benefit to the state's engineering firms," says Dan Duprey, chairman of the board at CPL and state Legislative Committee chair.

Duprey is also pushing for changes such as getting cities and towns to adopt Qualifications-Based Selection—a federal law requiring procurement of engineering services to be based on experience and qualifications and not lowest price. Also being advocated is getting a state law passed to prohibit contracts from holding engineering firms liable for the negligence of others, which cannot be covered by insurance.

The Member Organization also pushes for robust funding for projects at the local, state, and federal level, and ACEC New York is extremely active in raising money for its political action committee, with annual contributions topping \$90,000 in recent years.

RECOGNIZING EXCELLENCE

ACEC New York holds three large events each year. In addition to the Winter Conference, there's also the Metro Region Membership Meeting & Holiday Luncheon, which draws 250 or so attendees. But the Member Organization's claim to fame is its swanky Engineering Excellence Awards Gala, a black-tie affair that was held for years at the Waldorf Astoria. The event, which was moved to the New York Hilton when the Waldorf closed, draws up to 800 engineers and their clients, with members of Congress sometimes hosting.

Among a number of other awards, ACEC New York each year bestows its Empire Award for the top-ranked project designed and built in New York state. In 2020, the Empire Award went to Jacobs for the Onondaga County Green Stormwater Infrastructure Program (Save the Rain). Previous recipients include Arup and AECOM for their joint venture on Phase 1 of the Second Avenue Subway in New York City, and Jaros Baum & Bolles for One World Trade Center.

The gala is part of ACEC New York's larger effort to recognize and celebrate the often overlooked—but critical—work of engineers. "People tend to take engineers for granted," Simson says. "When the average person gets up in the morning, they don't think about where their water comes from and where it goes. Then they get on a train or subway, or they get in the car, and all those transit lines and roads and bridges were designed by engineers. It is important that we have found a way to recognize and celebrate, to the highest level, the accomplishments of engineers." ■

Calvin Hennick is a business, technology, and travel writer based in Milton, Massachusetts.

An aerial photograph showing a bridge under construction over a river. The bridge has a concrete deck and blue metal truss railings. Several workers in safety gear are visible on the bridge. The surrounding area is a mix of lush green forest and cleared, brown earth. In the background, there are rolling hills under a bright sky.

Making a Much-Needed Difference

BY CALVIN HENNICK

Tighe & Bond donated design services while working with the Cashman Family Foundation to build a bridge over the Rivière Cochon Gras for the residents of Perches, Haiti.



A young program
at an established
engineering firm is
helping to further
cement community
service as a bedrock
component of the
company's culture

G

iving back has always been important to the culture of Tighe & Bond, an engineering firm headquartered in Westfield, Massachusetts. But up until a few years ago, Senior Engineer Ron Maniscalco sometimes felt guilty when he had to miss a project meeting or client presentation to

perform volunteer work or attend a nonprofit board meeting.

“Before, I would feel really bad that I couldn’t make that town meeting at 7 p.m. because I was volunteering at a nonprofit board meeting, and I was putting my colleagues out,” Maniscalco recalls. “Now, my colleagues say, ‘Go to that board meeting!’”

This shift is due to Make a Difference, a program started in 2017 with the goal of formally recognizing Tighe & Bond employees who dedicate themselves to serving their communities. The program was founded by David Pinsky, former firm president and CEO, along with Margo Armstrong, vice president of human resources, to provide structured support for employee-led volunteer efforts.

“For generations, Tighe & Bond’s employees have demonstrated a passion for volunteerism, community service, and helping others in need,” says Pinsky. “The Make a Difference program highlights the importance of giving of one’s time and talent to benefit the communities in which we live.”

It also drives engagement. “People say, ‘Bring your whole self to work,’ and we get to see the causes that are important to everybody,” Armstrong says. “We’re not only making it OK for people to spend time volunteering, but we’re actively encouraging it and supporting it.”

AN EVOLVING PROGRAM

The Make a Difference program has changed a bit each year since its inception. It started with a commitment to internally recognize employees who volunteer for 100 or more hours during a



Students complete two rainwater collection systems at schools in Ghana.



“What these community activities allow us to do is stay connected outside the office and bolster and strengthen the culture.”

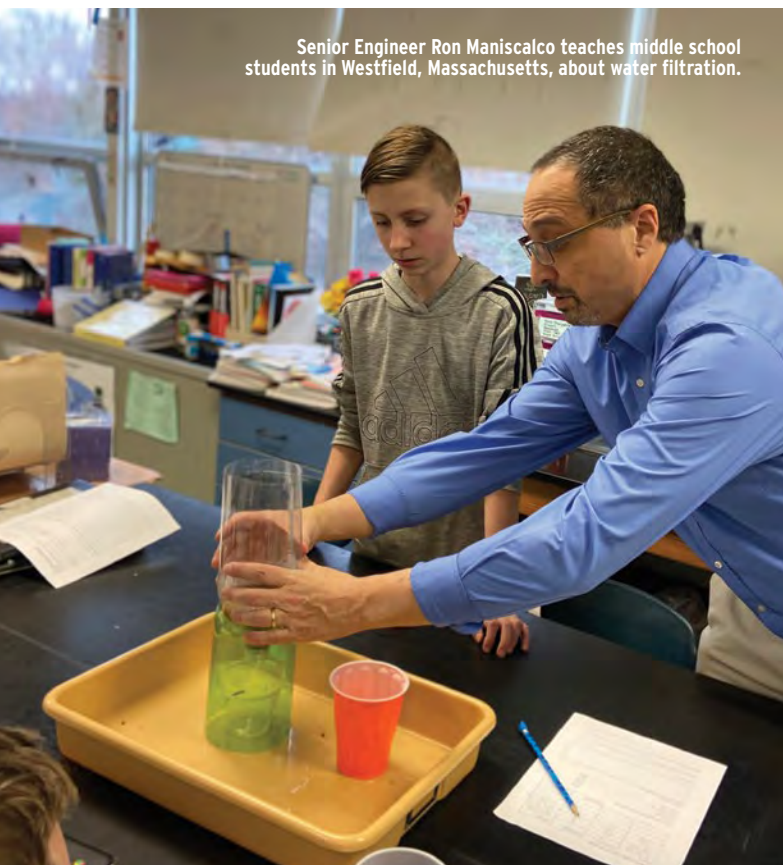
BOB BELITZ
PRESIDENT AND CEO
TIGHE & BOND



Tighe & Bond Vice President Wayne Bates with UMass Amherst students by a new bio-sand filtration system to provide clean water for the people of Saviefe-Deme, Ghana.



Senior Designer Cheryl Young brings her certified therapy dog Mason (right) to universities for stress relief during final exams.



Senior Engineer Ron Maniscalco teaches middle school students in Westfield, Massachusetts, about water filtration.



Students install the bio-sand filtration systems they designed using locally sourced materials.

year, as well as to make a financial donation to the cause of the employee's choice. The dollar amount of the donation corresponds with the age of the firm: This year, Tighe & Bond turns 110 years old, and the company will give \$110 to charity on behalf of each employee who passes the 100-hour mark.

During the second year of the program, leaders set—and employees met—a goal of 5,000 volunteer hours across the firm. The next year, the company announced that it would give an extra vacation day to employees who donated 32 hours of their time to charitable causes, and 80 employees crossed that threshold.

The program has increased ties among the company's employees—an especially important consideration as Tighe & Bond adds new team members, says Bob Belitz, the firm's president and CEO. "We've experienced some fairly rapid growth over the past five or six years," he notes. "We were 250 people when I joined the firm six years ago. Now we have 420. What these community activities allow us to do is stay connected outside the office and bolster and strengthen the culture."



UMass Amherst Engineers Without Borders Student Chapter members with the people of Saviefe-Deme, Ghana.

EMPLOYEES IN ACTION

Cheryl Young, a senior designer at Tighe & Bond, volunteers in several capacities. About seven years ago, she worked to get her dog certified as a therapy animal. She brought her pet into schools and libraries, where children read aloud to the animal for practice. She also began bringing the dog to a hospice home.

A Companywide Commitment

While Tighe & Bond's Make a Difference program emphasizes support for the volunteer efforts of individual employees, the firm also supports several companywide initiatives.

- In recent years, Tighe & Bond has made corporate financial contributions to more than 50 nonprofit organizations. Key recipients include Water for People and World Is Our Classroom.
- Employees have conducted several environmental cleanup projects. In the fall of 2020, employees volunteered with the Source to Sea cleanup organized by the Connecticut River Conservancy. A monthlong window allowed employees to clean up trash on their own schedules and enabled physical distancing.
- In 2019, Tighe & Bond partnered with the Cashman Family Foundation to donate engineering services to design a new bridge over the Rivière Cochon Gras for the residents of Perches, Haiti. The bridge will pro-

vide residents access to critical resources, including a hospital and industrial park, during the rainy season.

- For more than a decade, Tighe & Bond has participated in the Pan-Mass Challenge, a 192-mile bikeathon that raises funds for the Dana-Farber Cancer Institute.
- In response to the economic hardship caused by the COVID-19 crisis, Tighe & Bond has made donations to local food banks, and employees have volunteered with food pantries and other organizations that address food insecurity. The company has also provided a 50 percent match for every employee donation to a food bank or similar nonprofit, with matching funds going toward Feeding America, the country's largest domestic hunger relief organization.



Even after her pet died, Young continued to volunteer at the center, serving breakfast to residents.

Make a Difference not only supports the communities where the firm works, but also nurtures employees' own lives outside of the office. "The more that people volunteer, the more they will see that there's more to life than just working for yourself," Young says.

Young has also volunteered as an English as a second language tutor. "The reward is the opportunity to meet people from various countries and to learn about their culture, politics, and beliefs that can be quite different from mine," she says. "It's a great way of making friends with people I never would get a chance meet or talk to."

Wayne Bates, Ph.D., the vice president who leads the firm's Westwood, Massachusetts, office, has traveled to Ghana annually for several years as a traveling mentor for the University of Massachusetts at Amherst's chapter of Engineers Without Borders. Bates has helped lead projects such as rainwater collection systems for schools. He also enjoys mentoring future engineers. "What I like is seeing the students mature through their years in the program," he says. "The first year I traveled, there were a couple of young women who didn't have a lot of responsibilities. And then the next year they were the project managers, and I saw a whole new level of maturity from them."

Company leaders and employees have gotten to know each other better through the causes they serve, Armstrong says. "You see another side to people's personalities," she explains. "One employee volunteered for Girls on the Run. It was really cool to learn about this young millennial who was so passionate about helping girls to feel empowered. At work, I saw her as an engineer, and now I see her as someone who is really connected to the girls in our community."

Maniscalco has engaged in a range of volunteer work, including the Adopt-a-Classroom program for Westfield Public



Employees from Tighe & Bond's Shelton, Connecticut, office gathered to get rid of litter along the Trap Falls Reservoir during the 2019 Shelton Clean Sweep.



"It's definitely something that resonates with our staff. It really helps us with recruiting. Our talent acquisition manager always uses this as a selling point."

MARGO ARMSTRONG
VICE PRESIDENT OF HUMAN RESOURCES
TIGHE & BOND

Schools, where he performs science, technology, engineering, and math demonstrations for middle school students. A science teacher asked if Maniscalco could lead students through the cleaning of wastewater, and he came up with an exercise to demonstrate the concept: He crunched up chocolate chip cookies in water and then led students through multiple steps of filtration.

"The students got a chance to collaborate," Maniscalco says. "Everybody had a really good time with it."

It is important for students to have access to professionals such as Maniscalco, says Lauren Figy, supervisor of science, technology, and engineering for the school district. "Kids love to hear from people who aren't their teachers," she adds. "Having someone explain their career experience from their perspective allows kids to see themselves doing that career."

Maniscalco initially requested vacation time to cover the volunteer hours at the school, but his supervisors changed the hours to paid time. "They said, 'We want you to be doing this,'" he recalls.

CHANGING FIRM CULTURE AND THE COMMUNITY

The Make a Difference program is already having a significant impact on Tighe & Bond's company culture. Last year, about 45 percent of employees volunteered in some capacity, logging a total of more than 6,000 hours at over 250 charitable organizations.

"It's definitely something that resonates with our staff," Armstrong says. "It really helps us with recruiting. Our talent acquisition manager always uses this as a selling point. We all want to give back to the community."

At some companies, it is all about needing to bill employees' time, Maniscalco says. "But as engineers, our sole responsibility is to make sure the community is safe," he explains. "Our job is really to make our communities better, both by improving the infrastructure and enabling the people who live in our communities to do the things they want to do." ■

Calvin Hennick is a business, technology, and travel writer based in Milton, Massachusetts.

WORKING TOWARD *A MORE*

W

BY BOB WOODS



People with disabilities
employed by ACEC Member Firms
bring a distinct expertise to projects

ACCESSIBLE

WORLD



“**was fortunate to be** at the White House for the signing,” Jim de Jong says, recalling the historic occasion 30 years ago when President George H.W. Bush signed the Americans with Disabilities Act (ADA) into law.

De Jong, a member of the congressional task force that championed the bill, has used a wheelchair since 1976, when he was hit by a vehicle and paralyzed from the waist down. Already a fervent advocate for people with disabilities, he was newly energized by the ADA and its mandate to make the nation’s built environment more accessible to all people.

De Jong retired after nearly 28 years as director of the Great Plains ADA Center, a regional hub located at the University of Missouri, where he guided engineers, designers, architects, contractors, and public officials through the intricacies of ADA compliance on building and infrastructure projects. Not quite ready to call it quits, though, he is now leveraging his vast knowledge, experience, and passion as a consultant for Oates Associates, an ACEC Member Firm based in Collinsville, Illinois.

“My consultation is in working with government entities that are required to have a transition or self-evaluation plan to comply with the ADA—looking at what is already accessible and

what needs to be fixed so that people can participate in all aspects, from playgrounds to sidewalks to getting into city hall,” de Jong says. “I offer advice to the Oates engineering group to ensure that a governmental entity’s policies and procedures don’t discriminate against people with disabilities.”

For example, Oates and de Jong have teamed up to advise the city of St. Louis to ensure that its buildings,



Oates Associates worked with Jim de Jong on projects to assure that buildings, streets, sidewalks, and intersections in St. Louis are ADA compliant.

streets, sidewalks, and intersections are ADA compliant. This includes not only existing infrastructure but also new projects, such as the 22,500-seat stadium under construction for the city’s recently awarded Major League Soccer franchise, which will begin play in 2023.

De Jong is one of about 70,300 people with disabilities employed in a wide variety of architecture and engineering occupations, according to 2019 data from the U.S. Bureau of Labor



Molly King offered ADA and engineering expertise on the \$7 million Magnolia Avenue Streetscapes project in Knoxville, Tennessee.

Statistics. They represent just 1.2 percent of the total population of 5.9 million Americans with disabilities who work full or part time, which comprises 3.7 percent of the entire civilian labor force of roughly 158 million people.

There are efforts to educate, recruit, and hire more people with disabilities into the A/E profession. “True independence is when you’re independent economically, too,” de Jong says. “And that begins with education and opportunity in the workplace.”

PART OF THE SOLUTION

Molly King has achieved both. She earned a degree in civil engineering from Tennessee Technological University and has worked in the industry for 21 years, the last 16 with Barge Design Solutions, Inc., an ACEC Member Firm headquartered in Nashville, Tennessee. King, who uses a manual wheelchair, is an ADA technical adviser, responsible for reviewing Barge’s design plans for ADA compliance with local, state, and federal regulations. She also prepares construction drawings for projects throughout Tennessee, including roadway realignments and widenings, shared-use paths, and sidewalks.

In 1996 King was attending community college when she was in a car accident one Sunday morning on her way to church, sustaining a spinal cord injury that resulted in incomplete quadriplegia. “I can use my arms and wrists but not my fingers,” she says.



“True independence is when you’re independent economically, too. And that begins with education and opportunity in the workplace.”

**JIM DE JONG
CONSULTANT
OATES ASSOCIATES**



King transferred to Tennessee Tech in 1999 for its engineering program. “I was good at math,” she says, “and got it in my head that people good at math go into engineering.” She experienced problems accessing buildings while in college, but it was not until her first job at a firm in Nashville that King realized she could be part of accessibility solutions.

“When I got into site design, I saw more of these accessibility problems and wanted to educate myself, as a person with a disability, how to do design correctly and make it easy for anyone with a disability,” King explains. “Not only because I had a vested interest in it—I also want to educate other engineers, so their designs are good, and they don’t have to go back and do over something wrong.”

King’s education is ongoing. Aside from continuous learning on the job, she attends the National ADA Symposium—founded by de Jong in 1991—an annual conference where the latest information on the law, implementation strategies, and best practices are exchanged. “There are so many ADA guide-



“When I got into site design, I saw more of these accessibility problems and wanted to educate myself, as a person with a disability, how to do design correctly and make it easy for anyone with a disability.”

MOLLY KING
ADA TECHNICAL ADVISER
BARGE DESIGN SOLUTIONS



THE ADA, DIVERSITY, AND INCLUSION

The Americans with Disabilities Act (ADA) is a civil rights law that prohibits discrimination against people with disabilities in all areas of public life, including jobs, schools, transportation, and all public and private places open to the general public—from skyscrapers and airports to Little League fields and restrooms. The law ensures that people with disabilities have the same rights and opportunities as everyone else. The ADA improves the lives of 61 million adults with disabilities, or 1 in 4 adult Americans, which include people with impairments to their mobility, cognition, hearing, and vision.

By its nature, the ADA has always focused on diversity and inclusion, dual issues that have been heightened during recent demands for greater equality and social justice, particularly regarding race and gender. Lost sometimes in the current conversation, though, are people with disabilities, who continue to experience discrimination in various facets of their lives. Indeed, although 90 percent of companies claim to prioritize diversity, only 4 percent consider people with disabilities in those initiatives, according to a report from the Return on Disability Group.

“My dream has always been to reflect the society we live in and to break down barriers,” says Jim de Jong, who has used a wheelchair for more than 40 years and is an ADA consultant for Oates Associates. “Oates employs women and people of color, and now a person with disability, which helps them see diversity and inclusion with a broader spectrum.”

DESKCUBE/GETTY IMAGES



The DO-IT (Disabilities, Opportunities, Internetworking, and Technology) Center at the University of Washington promotes the use of technology among students with disabilities.

lines and standards, and when other employees ask me about something, I know about them,” King says.

King lent her ADA expertise, as well as her engineering know-how, to the recently completed \$7 million Magnolia Avenue Streetscapes Project in Knoxville, on which Barge participated. “I was involved from the very beginning,” she says, “helping to create cross-sections, roadway elevations, curb lines, and parking. And I worked with landscape architects on where to put items to be ADA compliant.”

LASTING CHANGE

While A/E firms often have someone on staff who is familiar with ADA compliance, a person with a disability in that role brings a personal perspective to design considerations that an able-bodied individual can inadvertently miss. “I know the little things that might be overlooked, like that bus stops need to have laydown areas for lifts,” King says.



This leads back to the fact that relatively few people with disabilities work in the A/E industry—or in other technology and science fields—and what’s being done to rectify that reality. For instance, the Foundation for Science and Disability (FSD), a nonprofit organization in Washington, D.C., promotes increased employment opportunities and improved work environments for people with disabilities in science, technology, engineering, and mathematics (STEM) jobs, with an emphasis on students.

“We encourage young people with disabilities to develop the skills they need to get into careers in STEM and help them find job openings,” says Richard Mankin, president of the foundation. Toward that goal, FSD has established an awards program that annually provides \$1,000 grants to qualified college graduate students with disabilities to support their research projects.

Mankin was born missing essential muscles in his legs and arms and uses braces and crutches to walk. While his disability did not impede him from becoming an entomologist, among the

70,300
people with
disabilities
are employed
in architecture
and engineering
occupations,
according to the
U.S. Bureau of
Labor Statistics

more than 6,000 members of the Entomological Society of America, to which he belongs, only about five who attend the annual meeting have visible disabilities, he estimates.

Sheryl Burgstahler, Ph.D., director of accessible technology services for University of Washington (UW)’s IT unit and an affiliate professor at UW Seattle’s College of Education, got involved in assisting STEM students with disabilities in the late 1970s. She had started a computer resource center at St. Martin’s College in Lacey, Washington, in the early days of

the PC. She helped a young man with quadriplegia learn to use a computer by pressing keys on the keyboard with his mouth stylus. But he could not press two keys at once, which was necessary to use keys like shift or control.

“I hired a graduate student to build a device that was wired into the keyboard and fixed the problem,” Burgstahler says. “All of a sudden, he was independent to program and do other things on his computer. That was my first experience with assistive technology.” The field now includes a multitude of devices to make everyday life, and work, easier for people with mobility, vision, hearing, and other disabilities, from prosthetic limbs to sophisticated electric wheelchairs.

Today Burgstahler is the founder and director of UW’s DO-IT (Disabilities, Opportunities, Internetworking, and Technology) Center and the Access Technology Center. Together, the centers promote the use of mainstream and assistive technology among students with disabilities in postsecondary education and careers, and help webmasters and faculty ensure their materials and curriculum are accessible to those students.

DO-IT led a project called AccessEngineering, designed to



DO-IT led a project called AccessEngineering to help engineering faculty make their courses accessible to students with disabilities.

broaden participation of people with disabilities in engineering academic programs and careers. “The program helps engineering faculty make their courses accessible to students with disabilities, so that when they graduate and pursue engineering careers, they will design products that are accessible to people with disabilities,” Burgstahler explains.

De Jong is encouraged that such academic initiatives will bring more people with disabilities into STEM careers, including engineering. “With all the advancements of the ADA, we still have a high unemployment rate for people with disabilities,” he says. “That needs to change to truly create equality and independence in the country. I’m very positive about where we’re going in the future, and Oates is a good example.” ■

Bob Woods is a technology and business writer based in Madison, Connecticut.

Deal-Makers Push Through Pandemic, Make Major Moves in Second Half of 2020

BY NICK BELITZ

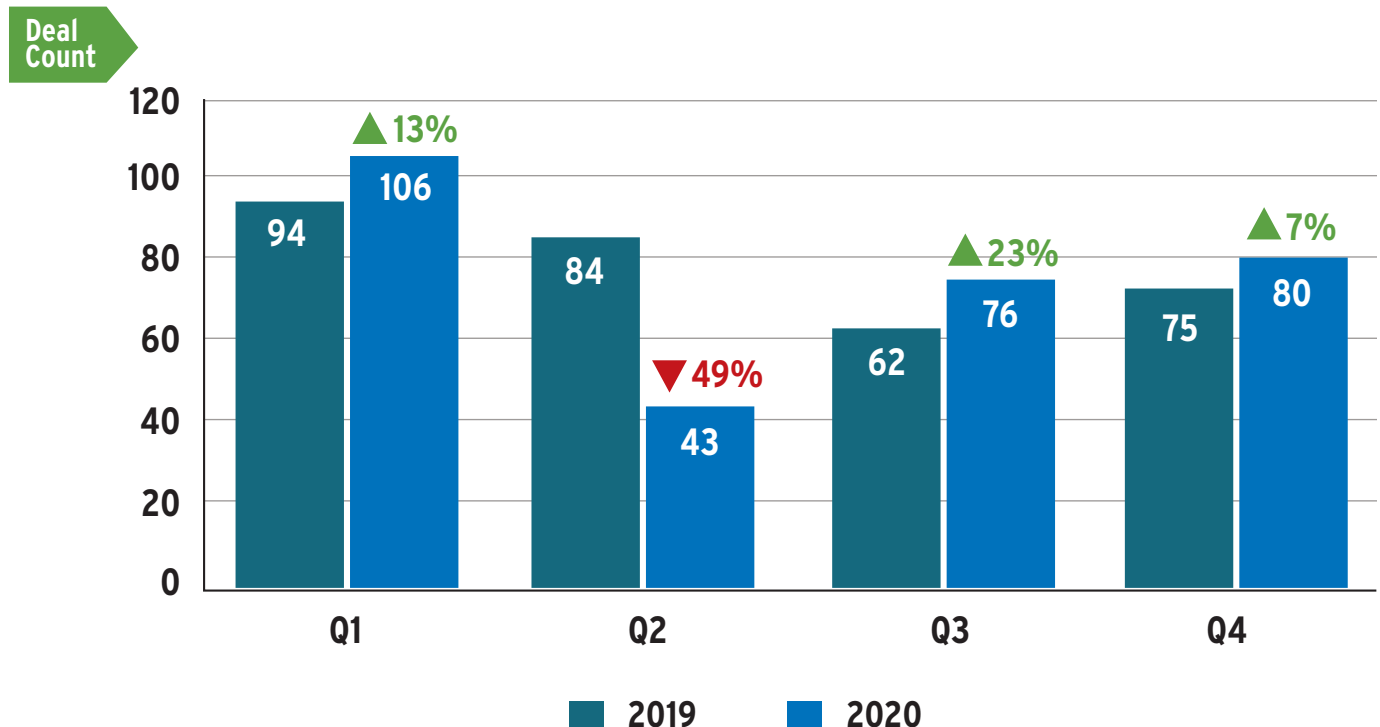
After a hot start in 2020, mergers and acquisitions among engineering firms slowed between April and June as the economic uncertainty created by the pandemic took its toll. As shutdown orders brought much of the economy to a halt, Morrissey Goodale tracked a nearly 50 percent decrease in industry deals in the U.S. during the second quarter of 2020, with 43 transactions completed compared to the same period in 2019, when we tracked 84 deals. But as shown in the accompanying chart, the second half of the year saw a rebound in transactions. Beginning in the summer months, pent-up demand for deal-making brought executives back to the bargaining table to such an extent that through the first two weeks of December, Morrissey Goodale tracked more deals in the second half of 2020 than we saw in the second half of 2019, which was the record-setting year for the industry in terms of the number of transactions. With a flurry of deals still expected to come through at the end of 2020, Morrissey Goodale anticipates deal activity for the full year will match and possibly

exceed the high-water mark of deal counts notched in 2019.

While the speed with which deal-making recovered following the onset of the pandemic somewhat surprised us, COVID-19 did nothing to upset the long-term drivers of engineering firm consolidation. Indeed, the latest deal announcements from ACEC members indicate the pandemic may have simply accelerated many of the trends already at work. Specifically:

1. Nontraditional deals are quite common. Judging by the announcements of ACEC deal-maker firms, the stay-at-home orders issued across the country got executives thinking about new technologies and different ways of doing the business of engineering. As examples, see the multiple deals announced by ACEC behemoth **Jacobs** (Dallas) (*Engineering News-Record* Top 500 Design Firms #1) aimed at expanding the firm's business innovation and transformation consulting as well as its analytics and artificial intelligence capabilities. See also **Tetra Tech's** (Pasadena, Calif.) (*ENR* #4) addition of an information technology services firm and **Parsons'** (Centreville, Va.) (*ENR* #12) acquisition in October of Braxton Science & Technology (Colorado Springs, Colo.), a firm specializing in

COVID-19's Impact on Industry M&A



serving the space, cyber, and intelligence markets. Also, ACEC member **Hayat Brown** (Washington, D.C.) went outside the metaphorical box by acquiring the public-private partnership advisory practice of Alvarez & Marsal (Washington, D.C.), a decidedly non-engineering management consulting firm perhaps best known for its roots as financial restructuring specialists (read: “hard-nosed loan workout negotiators”).

With the pandemic having created the conditions for change and innovation in all areas of the A/E industry, forcing firms (at minimum) to upgrade their technology infrastructure to support employees and clients, forward-thinking leaders will continue to look for ways to diversify their services and offer more value to their clients.

2. Big players get bigger. As one would expect during a time of economic uncertainty and contraction, smaller firms sought shelter from the economic storm via partnerships with major, more diversified players. But in the second half of 2020, even already large firms joined forces with industry titans, forcing yet another shake-up for the annual *ENR* Top 500 Design Firms list. Notably, WSP (Montreal) (*ENR* #7) acquired 60-year-old Golder Associates (Palm Beach Gardens, Fla.) (*ENR* #18) while Stantec (Edmonton, Alberta) (*ENR* #11) acquired Midwestern-based environmental leader Wenck (Maple Plain, Minn.) (*ENR* #127).

With uncertainty in spending by state and local governments—brought on by tax revenue declines stemming from COVID restrictions—still very much an issue in the years ahead, we anticipate an ongoing degree of defensive deal-making. We expect no small number of firm owners, many of whom have now endured an epic economic collapse in the Great Recession and—a mere 10 years later—a once-in-a-hundred-years global pandemic, will decide their entrepreneurial itch is sufficiently scratched and look for safety in numbers by selling to a larger firm.

Looking ahead, Morrissey Goodale anticipates 2021 may potentially be the biggest year ever for U.S. deals. A presumed economic rebound, helped in part by widespread distribution of a COVID vaccine, will provide a boost to all states, but particularly those with stronger economies and those that better weathered the shutdown-driven loss of tax revenue. Presumed higher spending in these states will drive greater demand for engineering services and therefore more M&A transactions. Further, we anticipate that many U.S. firms finished 2020 with strong utilization, billings, and backlogs as design work was deemed essential during the shutdown orders by most state and local governments. These firms are well positioned to take advantage of the next economic growth cycle and, whether as buyers or sellers, join the ranks of deal-makers.

ACEC DEAL-MAKERS DECEMBER 2020

ACEC member **AECOM** (Los Angeles) (*ENR* #2) announced the signing of a definitive agreement to sell its civil construction business to affiliates of **Oroco Capital** (Bethesda, Md.). The transaction closed in January 2021.

To view the most up-to-date and “live” versions of the M&A heat maps, and to see who are the buyers and sellers in each state, go to www.morrisseygoodale.com.



Nick Belitz is a principal with Morrissey Goodale, LLC, a management consulting firm that specializes in the A/E industry and provides strategic business planning, merger and acquisition, valuation, executive coaching, leadership development, and executive search services. He can be reached at nbelitz@morrisseygoodale.com.

ACEC member **Terracon** (Olathe, Kan.) (*ENR* #22) acquired **TAM Consultants** (Williamsburg, Va.), a professional services firm providing a full range of facilities engineering and design services to public and private sector clients.

ENR's #7-ranked global design firm, **WSP** (Montreal), entered into an agreement to acquire ACEC Member Firm **Golder Associates** (Palm Beach Gardens, Fla.) (*ENR* #18), a global engineering and consulting firm with over 60 years of experience in providing earth science and environmental services.

ENR's #11-ranked global design firm, **Stantec** (Edmonton, Alberta), signed a letter of intent to acquire *ENR*'s #129-ranked environmental firm, **Wenck** (Maple Plain, Minn.). Wenck is an environmental engineering firm with core expertise in air, water, waste, food processing, natural resources, and infrastructure. Both firms are ACEC members.

ACEC member **TRC Companies** (Windsor, Conn.) (*ENR* #20) expanded its environmental and renewable energy capabilities with the acquisition of **Shoener Environmental** (Dickson City, Pa.), a firm that consults on the development and permitting of renewable energy projects and greenfield development projects.

Wetland Studies and Solutions (Gainesville, Va.), a subsidiary of **Davey Resource Group** (Kent, Ohio), acquired environmental and engineering services company **EEE Consulting** (Mechanicsville, Va.). Both firms involved in the deal are ACEC members.

RTM Engineering Consultants (Schaumburg, Ill.) acquired **RCE Consultants** (Laguna Woods, Calif.), a civil engineering firm specializing in water, wastewater, public works, private land development, industrial, and water quality sectors. RCE Consultants is an ACEC member.

ACEC member **IBI Group** (Toronto, Canada) acquired **Cole Engineering Group** (Markham, Canada). Cole offers consulting and advisory services in the water, transportation, urban development, and environmental sectors.

NOVEMBER 2020

ACEC member **Jacobs** (Dallas) (*ENR* #1) announced it will form a strategic partnership with **PA Consulting** (London), an innovation and transformation consulting firm, in which Jacobs will acquire a 65 percent stake in PA. **Jacobs** also strengthened

its high-priority analytics, all-source intelligence, and cyber artificial intelligence capabilities through the acquisition of **The Buffalo Group** (Reston, Va.).

ACEC member **Braun Intertec** (Minneapolis) (*ENR* #98), an engineering, consulting, and testing firm with more than 35 offices in seven states, acquired environmental consulting firm **Anderson Kelsey Group** (St. Louis Park, Minn.).

Benesch (Chicago) (*ENR* #119) acquired **S+H Group** (Nashville, Tenn.), an engineering firm serving private and local agency clients with utility design, geotechnical engineering, land development, construction administration, and capital improvement planning services. Benesch is an ACEC member.

ACEC member **Crawford, Murphy & Tilly** (Springfield, Ill.) (*ENR* #238) continued its Southeast expansion through the addition of **KB Environmental Sciences** (St. Petersburg, Fla.).

TRC Companies (Windsor, Conn.) (*ENR* #20) acquired **1Source Safety and Health** (Exton, Pa.), a firm that provides management consulting services in areas such as indoor air quality, asbestos management, industrial hygiene, and safety management systems. TRC is an ACEC member.

PRIME AE Group (Baltimore) (*ENR* #246) acquired **Integrated Engineering** (Lexington, Ky.), a 40-person engineering and surveying firm focused on transportation, structures, water/wastewater, stormwater management, aviation, site development, and landscape architecture. Both firms are ACEC members.

ACEC member **Karins and Associates** (Newark, Del.), an engineering, surveying, and planning firm, acquired **Adams-Kemp Associates** (Georgetown, Del.), a land planning and surveying firm specializing in boundary and control surveys, topographic surveys, wetlands location surveys, construction stakeout, site plans, and small subdivision design.

ACEC member **Hayat Brown** (Washington, D.C.) acquired the public-private partnership infrastructure and real estate advisory practice of **Alvarez & Marsal** (Washington, D.C.).

ACEC member **Jensen Hughes** (Baltimore) (*ENR* #112), a global leader in safety, security, and risk-based engineering and consulting, acquired fire protection engineering firm **CFT Engineering** (Burnaby, British Columbia).

OCTOBER 2020

ACEC member **Parsons Corp.** (Centreville, Va.) (*ENR* #12) entered into a definitive agreement to acquire **Braxton Science & Technology Group** (Colorado Springs, Colo.) and its subsidiaries in a deal valued at \$300 million. The acquisition increases Parsons' solutions, products, and capabilities in the space, cyber, and intelligence markets.

Barr Engineering Co. (Minneapolis) (*ENR* #100) acquired **King & MacGregor Environmental** (Grand Rapids, Mich.), expanding its environmental capabilities and water resources practice in Michigan and beyond. Barr is an ACEC member.

ACEC member **AECOM** (Los Angeles) (*ENR* #2), announced

the closing of the sale of its Power construction business to affiliates of **CriticalPoint Capital** (Manhattan Beach, Calif.).

ACEC member **Kleinfelder** (San Diego) (*ENR* #63) continued its rapid growth through the acquisition of utilities and pipeline services firm **Gas Transmission Systems** (Walnut Creek, Calif.). **Kleinfelder** also acquired full-service consulting firm **Poggemeyer Design Group**, another ACEC member (Bowling Green, Ohio), plus its subsidiaries.

McKim & Creed (Raleigh, N.C.) (*ENR* #148) acquired **Matchpoint Water Asset Management** (Wilmington, N.C.), the largest water loss and recovery and leak detection company in the U.S. Matchpoint uses smart technology to recover water that is lost through infrastructure defects or aging. McKim & Creed is an ACEC member.

ACEC member **BES, Inc.**, (Tampa, Fla.) acquired the Connecticut assets of **M Int'l Engineering** (Queens Village, N.Y.). The deal will add construction engineering inspection and structural inspection to BES's existing services.

Pioneering transportation and infrastructure engineering firm **CONSOR Engineers** (Houston) (*ENR* #125) acquired **Apex Design** (Denver), a technology-focused transportation planning, engineering, and construction management firm. Apex Design is an ACEC member.

ACEC member **Barton & Loguidice** (Liverpool, N.Y.) (*ENR* #316) extended its footprint into the New England market with the acquisition of **Anchor Engineering Services** (Glastonbury, Conn.), a multidisciplinary engineering and land surveying firm.

ACEC member **Woolpert** (Dayton, Ohio) (*ENR* #72) acquired **Jviation** (Denver), an airport planning, surveying, architecture, engineering, and construction management firm.

ENR's #34-ranked global design firm, **Hatch** (Mississauga, Ontario), and rail engineering specialist **LTK** (Ambler, Pa.) confirmed they are in the final stages of negotiating an integration of the two firms. LTK is an ACEC member.

ACEC member **Stantec** (Edmonton, Alberta) (*ENR* #8) acquired **Teshmont** (Winnipeg, Manitoba), an electrical engineering consulting company specializing in high-voltage power transmission and distribution engineering.

SEPTEMBER 2020

ACEC member **Parkhill** (Lubbock, Texas) (*ENR* #249) announced that surveying group **Lemke Land Surveying** (Norman, Okla.) joined Parkhill, bringing highly specialized expertise in land surveying and geospatial mapping. Parkhill also announced that civil engineering firm **Cardinal Engineering** (Norman, Okla.) joined the company.

ACEC member **Willett, Hofmann & Associates** (Dixon, Ill.) acquired engineering, land surveying, and architectural design firm **Ament Design** (Arlington Heights, Ill.).

Tetra Tech (Pasadena, Calif.) (*ENR* #4) further expanded its advanced analytics business with the addition of information technology services firm **BlueWater Federal Solutions** (Chantilly, Va.). ■



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On the Move

Charles Craddock has been named chairman, president, and CEO of Chicago-based **Clark Dietz, Inc.**, succeeding **John I. Boldt**, who previously served as chairman and retired March 1, 2021. **Jerry Payonk** was reelected executive vice president, and **Wesley Christmas** was elected executive vice president. **Mustafa Emir** was reelected secretary, and **Sean Widener** was elected treasurer.

Louis Gallucci has been named president and CEO of Woodridge, Ill.-based **V3 Companies, Ltd.** He joined the firm in 2003 and most recently served as executive vice president and business development director, leading teams serving the transportation and power and energy markets. Gallucci is a board member of ACEC Illinois.

Chris Schultz has been named president of San Antonio, Texas-based **Raba Kistner**, succeeding **Gary W. Raba**, who transitions to the new role of strategic growth officer and will remain part of the company's leadership team. Schultz most recently served as COO of the Consultants division. **Gabriel Ornelas**

Jr. has been named to succeed Schultz as COO of the Consultants division. He most recently served as the Dallas–Fort Worth marketplace leader.

Marc Damikolas was promoted to COO of Walnut Creek, Calif.-based **Brown and Caldwell**. A 20-year veteran of the company, Damikolas previously served as director of operations and is based in Irvine, Calif.

Shawn Fitzhugh has been promoted to COO of Denver-based **CTL|Thompson**. Fitzhugh joined CTL in 1997 and most recently served as vice president and manager of the firm's Denver division, which he will continue to oversee.

Ray Spangler has joined Nashville, Tenn.-based **Barge Design Solutions, Inc.**, as CTO. Spangler previously spent 25 years with Verizon Wireless where he led cross-functional teams in enterprise architecture, resource integration, process automation, and network design.

Ret. Lt. Gen. Todd T. Semonite, former chief of engineers and commanding general of the U.S. Army Corps of

Engineers (USACE), has joined New York City-based **WSP USA**, as president of the Federal Programs business. He will be based in the firm's Washington, D.C., office.

Joe Barbagallo has been named president of consulting for Fort Collins, Colo.-based **Woodard & Curran**, succeeding **Phyllis Brunner**, who is transitioning out of the position. Barbagallo most recently served as municipal and institutional business leader.

Joseph Deery has joined Harrisburg, Pa.-based **Gannett Fleming** as a senior vice president and market executive. He will lead client and project development strategies with an emphasis on growing and diversifying services in California and the Western U.S. He is based in the San Francisco office.

New York-based **STV** announced the following appointments: **Charles Hall** has joined the firm as senior vice president and director of major project delivery in the firm's Transportation and Infrastructure Division. **Frank J. Greene**



Charles Craddock



Jerry Payonk



Wesley Christmas



Louis Gallucci



Chris Schultz



Gabriel Ornelas Jr.



Marc Damikolas



Shawn Fitzhugh



Ray Spangler



Ret. Lt. Gen.
Todd Semonite



Joe Barbagallo



Joseph Deery

has joined the company as vice president and justice practice leader. Prior to joining STV, Greene was a founding principal of RicciGreene Architects, a leader in the courts and corrections field. Both are based in the New York City office.

Kansas City, Mo.-based **TranSystems** promoted the following to principal and senior vice president: **Chad Gartner**, Fort Worth, Texas; **Larry Kirchner**, Chicago; and **Jeff Lackey**, Wichita, Kan. The following were promoted to vice president: **John Bergman**, Charleston, S.C.; **Anna Dukes**, Chicago; **David Lee**, Berkeley, Calif.; **Matt Smith**, Schaumburg, Ill.; **Alex Stone**, Atlanta; **Todd Thalmann**, Kansas City, Mo.; and **Lenny Velichansky**, Boston. The following were promoted to assistant vice president: **Kelsey Kropp**, Kansas City, Mo.; **Tanya Lindquist**, Houston; and **Brian Racine**, Chicago.

TranSystems also announced the following new hires: **Brent Downing** has joined the firm as vice president and managing director of the Great Lakes East area overseeing sales and operations for three Ohio offices. He is based in the Columbus office. **Anthony Quigley** has joined the company as vice president

and regional construction practice leader overseeing Illinois and surrounding states.

Jackson, Miss.-based **Neel-Schaffer, Inc.**, and affiliate firm **True North Emergency Management, LLC**, announced the following promotions: Neel-Schaffer named six new vice presidents: General Counsel **Ed Everitt**, Telecom Manager **Albert Wilson**, and Engineers **Glenn Ledet**, **Kris Lightsey**, **Connie Standige**, and **Chris Trebisky**. At True North, **Derrick Tucker** was promoted to senior vice president, and **Doug Amato**, **Kingsley McCallum**, and **Richard Sosebee** were promoted to vice president.

WSP USA also announced the following appointments: **Keyur Shah** is rejoining the company as a vice president and managing director for the firm's U.S. Asset Management practice. He will help clients take advantage of advances in data analytics and asset management tools and technologies. Shah, who most recently served as senior director at Gartner, Inc., is based in the Orange, Calif., office. **Alex Ralli** has been named vice president and aviation principal, where he will be responsible for the strategic long-term growth of the business within target markets, managing client relations

and civic engagement activities, and leading key projects within all aviation disciplines. **David Pizzimenti** has joined the company as vice president and alternate delivery leader for the Southeast region. He is based in the Miami office.

Gary Etter has joined Philadelphia-based **Urban Engineers** as vice president and New Jersey regional manager. Etter, who most recently served as COO of Greenman-Pedersen, serves on the ACEC of New Jersey executive committee.

Mack Conachen has joined New York City-based **Thornton Tomasetti** as vice president and San Diego office director, where he will be based. Conachen will help strengthen the firm's position in the health care and science/technology markets in the region. He previously served as a senior structural engineer at IMEG Corp. in San Diego.

Vice President **Daniel Rukakoski** has been appointed business line leader for the Environmental Consulting services of Westfield, Mass.-based **Tighe & Bond**. Rukakoski has more than 25 years of experience in environmental consulting and leads the environmental permitting efforts for municipal, commercial, and public utility projects throughout the Northeast.



Charles Hall



Chad Gartner



Larry Kirchner



Jeff Lackey



Ed Everitt



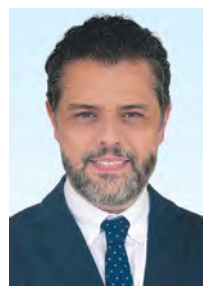
Derrick Tucker



Keyur Shah



Alex Ralli



David Pizzimenti



Gary Etter



Mack Conachen



Daniel Rukakoski



John F. Hennessy III

John Hennessy, who served as 2008–2009 ACEC chair, died on Feb. 21, after a long illness.

Hennessy began his career in the New York office of Syska Hennessy as a project mechanical engineer and worked on numerous projects including the Jacob Javits Convention Center in New York. In 1989, he assumed the position of CEO of Syska Hennessy Group.

As ACEC chair and in subsequent years, Hennessy guided ACEC's initial forays into social media.

He was actively involved in numerous philanthropic and charitable organizations, including 31 years of support and leadership at The Salvation Army.

Donations in his honor can be made to the American Heart Association or a charity of your choice.

Welcome New Member Firms

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Caprine Engineering
Mountain Brook

ACEC Arkansas

Jack Tyler Engineering
Little Rock

ACEC California

Abraxas Energy
Consulting, LLC
San Luis Obispo
Dudek
Encinitas
Hull, Inc.
Truckee
Kiewit Engineering
Group, Inc.
Los Angeles
Linwood Engineering, Inc.
Irvine
R. McCarthy
Consulting, Inc.
Newport Beach
Rasmussen Land
Surveying, Inc.
Monterey
UNICO Engineering, Inc.
Folsom
Vang, Inc.
Consulting Engineers
Clovis

ACEC Colorado

Austin Civil Group, Inc.
Grand Junction

Granite Engineering Group, Inc.

Colorado Springs
Maser Consulting, P.A.
Lakewood
Best Engineering Solutions
& Technologies, LLC
Lakewood
Escalante Construction
Management and
Engineering, Inc. (ECME)
Mancos
Vortex Engineering &
Architecture, Inc.
Grand Junction

ACEC-CT

Down to Earth
Consulting, LLC
Naugatuck

ACEC-FL

AE Engineering, Inc.
Jacksonville
CORE Engineering
Group, LLC
Orlando
Keister Webb Structural
Engineers, LLC
Jacksonville
Quantum Electrical
Engineering, Inc.
Coral Springs
The Searight Group, Inc.
Panama City

Tigerbrain Engineering, Inc.

Geneva
Zumacon, LLC
Doral

ACEC Georgia

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Atlanta
LCW Engineering, Inc.
Decatur
Passero Associates, LLC
Roswell
Practical Design
Partners, LLC
Tucker
Ramos Consulting, LLC
Marietta

ACEC Hawaii

Kaula AE, LLC
Honolulu

ACEC Illinois

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Engineering, LLC
Arlington Heights
Engineering Design
Source, Inc. (EDSI)
Collinsville
Hardesty & Hanover, LLC
Chicago
Pinpoint Precision
Engineering
Chicago

Shannon & Wilson, Inc. Chicago

ACEC Kansas

Wood
Topeka

ACEC-KY

Duke Engineering Co.
Mt. Sterling
Eclipse Engineers, PLLC
Somerset
HNTB Corp.
Louisville

ACEC of Louisiana

Cardno
Mandeville

ACEC/MW

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McCormick Taylor, Inc.
Landover, Md.
Omnium Infrastructure
Solutions
Vienna, Va.
Precision Systems, Inc.
Washington, D.C.
Somat Engineering
DC, LLC
Washington, D.C.
Specialized Engineering
(DIW Group, Inc.)
Frederick, Md.
Wave Civil, LLC
Annandale, Va.

ACEC/MS

Cook-Allen Engineers & Surveyors
Eupora

ACEC Nebraska

Advanced Engineering Systems, Inc.
Lincoln
EAD Management Services, Inc.
Omaha

ACEC Nevada

PMCM Consulting Services, LLC
Henderson

ACEC-NH

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ACEC of New Jersey

Traffic Planning and Design, Inc.
Camden

ACEC New Mexico

Maser Consulting, P.A.
Albuquerque

ACEC New York

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Port Jefferson Station
InfoTran Engineers, P.C.
Fresh Meadows
Lozier, Inc.
Whitestone
Promina Engineering P.C.
Astoria
Trolleydia Engineering, PLLC
Elmont

ACEC/NC

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Greensboro
Fleming Engineering, Inc. (FEI)
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Noble Structural Group, PLLC
Cornelius

ACEC Ohio

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Loveland

ACEC/PA

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Lititz
Joe Hunt & Associates, P.C. (JHA Companies)
Montrose

ACEC-SC

Aulick Engineering, LLC
Atlanta, Ga.

Heath & Lineback

Engineers, Inc.
Marietta, Ga.
MBP Carolinas, Inc.
Raleigh, N.C.

ACEC of South Dakota

AE2S
Rapid City

ACEC Tennessee

Maser Consulting, Inc.
Brentwood
Ragan-Smith Associates, Inc.
Nashville
Structural Design Group, Inc.
Nashville
Thompson Engineering
Chattanooga

ACEC Texas

Burton's Mechanical, Inc.
Grand Prairie
CEI Engineering Associates, Inc.
Dallas
Encotech Engineering Consultants, Inc.
Austin
Landtech, Inc.
Houston
Langford Engineering, Inc.
Houston
Lunsford Associates, LC
Arlington
Meals-Myers Engineering & Surveying, LLC (Meals-Myers)
San Antonio
Modern Geosciences
Colleyville
Oil Field Development Engineering, LLC
Houston

Pioneer

Engineering, LLC
Houston
Roadway Asset Services, LLC
Highland Village
Tsen Engineering
Austin
TSIT Engineering & Consulting, LLC
Irving
Wilson & Company, Inc., Engineers & Architects
El Paso

ACEC Utah

Avalon Business Engineering Services
Clearfield
Mid-State Consultants, Inc.
Nephi

ACEC Virginia

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Roseland

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IronOrbit

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APRIL 2021

- 14** Storytelling: How Philanthropy Can Help Tell Your Firm's Story (online class)
- 15** A Proposal for Building Purposeful Teams (online class)
- 20** Coordinating the Scope of Services: EJCDC's New Construction Manager as Advisor Documents and the 2020 EJCDC Owner-Engineer Agreement (online class)
- 22** Standard of Care (online class)
- 26-28** ACEC 2021 Virtual Annual Convention and Legislative Summit

MAY

- 5** Risk Strategies for a Changing Global Market (online class)
- 6** Cultivating the Conversation: Diversity, Equity, and Inclusion (online class)
- 11** Pros and Cons of ESOPs in A/E Firms (online class)
- 12** Engineering in the Age of Pandemics (online class)
- 13** A Time of Transitions—Project Managers to Firm Leaders (online class)
- 19** Suddenly Virtual: Business Models for the New Professional Services Marketplace (online class)
- 25** Leadership, Engagement, and Burnout Prevention in a World of COVID and Change
- 26** A Veteran CEO's Thoughts on Leadership (online class)

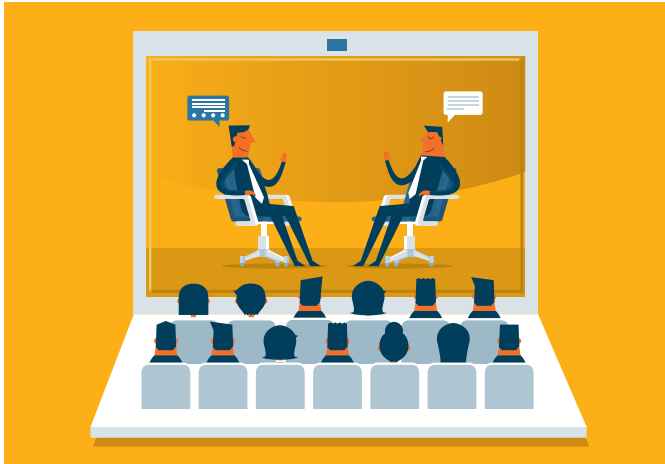
JUNE

- 1** Effectively Managing Conflict in Organizations (online class)
- 9** Why M&A Deals Fail (online class)

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For more information and to register, visit: <https://programs.acec.org/bdc2021>. For questions or to inquire about group registration discounts, contact Katie Goodman, director of leadership programs, at kgoodman@acec.org.

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online to manage their continuing education. RCEP is a powerful resource for firms to manage and track their staff's continuing education programs. Firms can create customized reports to track continuing education credits earned toward renewing licenses, identify specific courses and seminars for staff improvement, and use RCEP to recognize and award merit increases to employees for their continuing education achievements. Unique to RCEP is the Provider network and master calendar.



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