NOVEMBER/DECEMBER 2015

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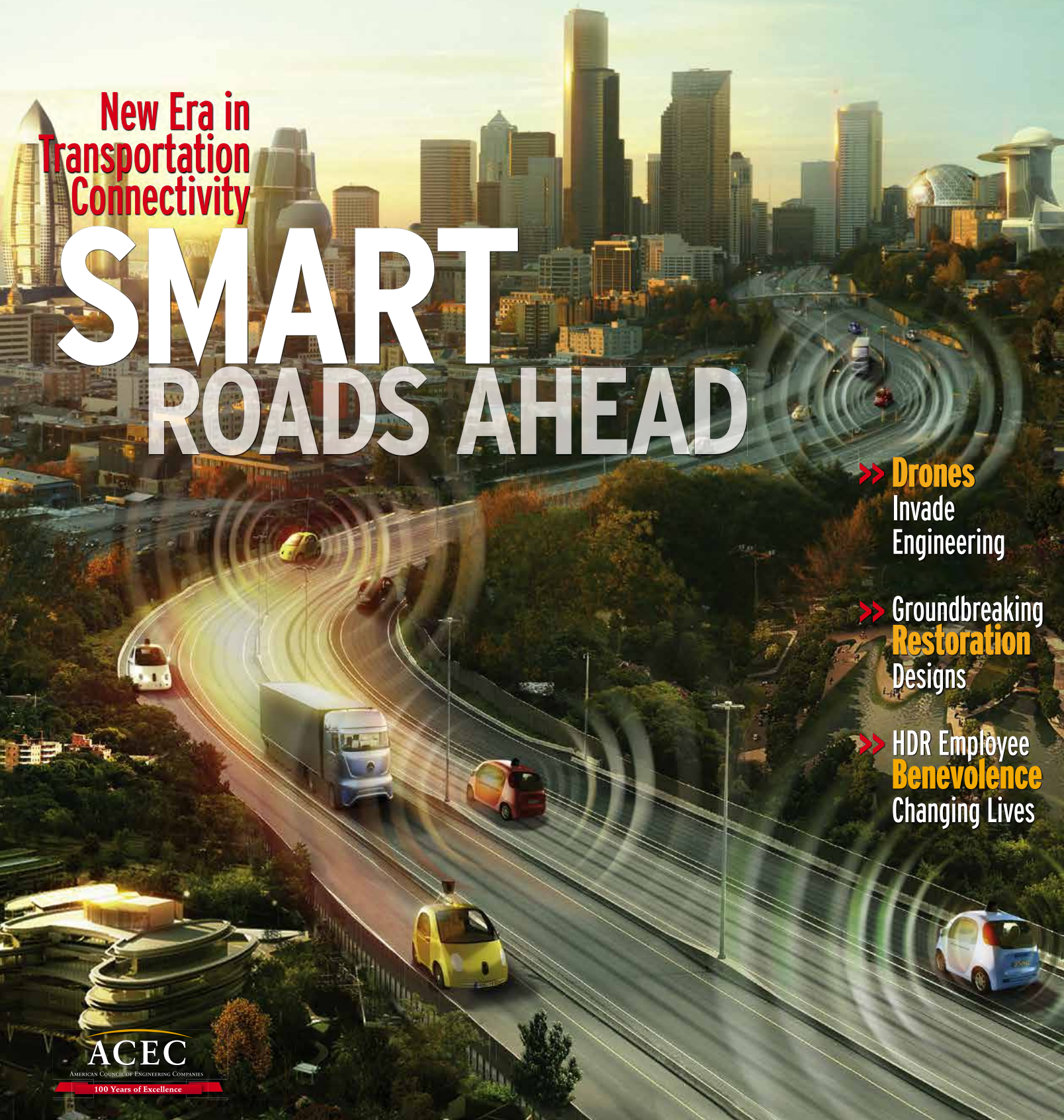

New Era in Transportation Connectivity

SMART ROADS AHEAD

>> **Drones** Invade Engineering

>> Groundbreaking **Restoration** Designs

>> HDR Employee **Benevolence** Changing Lives

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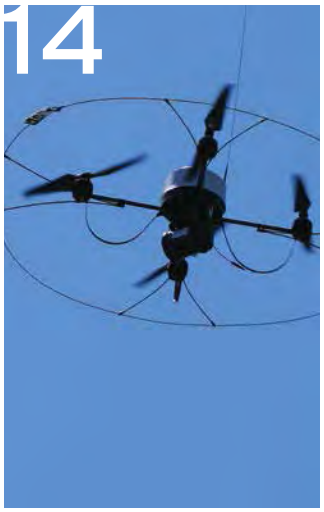

COVER PHOTO: C.J. BURTON

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Engineering Inc. promotes the advocacy and business interests of ACEC by offering news, legislative analysis and business practice information to member firms, clients, opinion leaders and policy makers.

From ACEC to You

Progress on Capitol Hill, ACEC/PAC Heads to Strong Finish

Congress is set to pass a major surface transportation bill by Thanksgiving—a significant bipartisan accomplishment that ACEC has championed for some time. The bill will help address America's infrastructure deficit, advance many needed reforms, and provide greater certainty for our members in their planning.

Both parties have also come together on a new budget deal that will prevent further across-the-board cuts (known as sequestration), setting the stage for passing spending bills in December to support critical federal programs in 2016.

The Council continues to urge Congress to extend key tax code provisions, such as the R&D tax credit, production tax credits to support renewable energy, and business expensing incentives that benefit our industry—all of which we expect Congress to address by the end of the year.

Critical to achieving these and other objectives—including passing comprehensive energy legislation—is a strong ACEC/PAC. It gives us the means to support lawmakers in both parties who advance our agenda. We greatly appreciate the contributions of ACEC members to our PAC, which will soon reach its strategic goal of $1 million.

It is also noteworthy that *Engineering Inc.* has just won three Gold Awards—for cover design, feature writing, and overall magazine content—from MarCom, an international competition honoring excellence in marketing and communications.

We wish you and your families a happy holiday season and look forward to working with you in the new year to advance the agenda of our industry.

Ralph W. Christie, Jr.
ACEC Chairman

David A. Raymond
ACEC President & CEO

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STAFF EDITOR Andrea Keeney
akeeney@acec.org
202-682-4347
SENIOR COMMUNICATIONS WRITER Gerry Donohue

ACEC PUBLIC RELATIONS AND EDITORIAL ADVISORY COMMITTEE

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ADVERTISING SALES

Leo Hoch
ACEC
1015 15th Street, NW, 8th Floor
Washington, D.C. 20005-2605
202-682-4341
lhoch@acec.org

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BY GERRY DONOHUE

Domestic Freight Market Surge on Horizon

The outlook for the domestic freight market is bright. Propelled by continued population growth, an expanding economy, the energy sector and rising foreign trade, the major modes of domestic freight transportation—trucking, rail and pipeline—are forecast to grow strongly over the coming decade. In the short term, however, the market could be in for a bumpy ride.

Mode Shares to Shift

According to the American Trucking Associations' (ATA) *U.S. Freight Transportation Forecast to 2026*, domestic freight volumes will increase by 28.6 percent over the next 11 years.

Trucking is the primary freight hauling mode, and while its tonnage will grow substantially over the ATA's forecast period, trucking's share of total freight will fall from 68.8 percent in 2014 to 64.6 percent in 2026.

Rail faces the same situation. Overall tonnage volumes will increase, but its share of the overall market will decrease, from 14.2 percent in 2015 to 12.3 percent in 2026. Within the rail segment, intermodal freight will be an increasingly important segment, rising by 4.5 percent annually through 2021 and then increasing by 5.3 percent annually to 2026.

Propelled by the dramatic growth in domestic energy production, pipeline volumes will increase by an average of 10.6 percent a year, and the sector's share of freight tonnage will rise from 10.8 percent in 2015 to 18.1 percent in 2026. (For more on energy production and pipelines, see Market Watch in the July/August 2014 issue of *Engineering Inc.*)

In the even longer term, Keith Bucklew, freight practice leader at CDM Smith, forecasts that "between now and 2040, freight volumes are projected to increase by 40 to 60 percent."

Dip in the Road

Stuart Matthis, vice president for business development at STV, Inc., says that 2014 and early 2015 were great years for the U.S. freight business. "In fact, they were so good that it created shipping problems brought on by the higher demand for freight carrier traffic," he says.

Two factors that propelled the sector were the economy's accelerating emergence from the 2008 recession and the exponential growth of the domestic energy market.

In recent months, however, the sector's momentum has slowed, and engineering firms are feeling the impact.

Firm leaders point to Congress' repeated failure to pass a long-term transportation funding bill as a huge drag on the domestic freight sector.

"We're seeing DOTs and other public entities actually walking away from federal highway grants because they don't have the local matching funds," says Jeff Keating, senior associate of rail and transit at H.W. Lochner. "We've rarely seen that before."

"Financially, many states are struggling," Bucklew says. "They're so far behind in their infrastructure programs that they need an increase in both federal and state funding just to preserve and maintain existing highways."

TranSystems transformed a heavily congested freight yard into this three-level rail overpass to eliminate a major bottleneck near Kansas City, Mo. The project featured a 9,300-foot-high flyover and was a 2005 Engineering Excellence Awards Grand Award winner.

Railroads are also feeling the pinch, due primarily to turmoil in the energy markets.

Coal has long accounted for a substantial share of railroad freight tonnage, but "the movement of thermal coal has been significantly reduced due to market changes [and] environmental and political pressures," says Scott Goehri, senior vice president and global market sector director for freight rail at HDR. Coal shipments for steel manufacturing have also flattened, and while rail shipments of crude oil have increased, they cannot come close to filling the void.

The slowdown appears to have cut into railroad companies' infrastructure spending. Nationally, railroads have been spending more than $100 billion in infrastructure from 2011 to 2014 and were projecting to spend an estimated $29 billion in 2015.

"There have been reports that the railroads aren't going to spend the money this year that they had announced," says Keating. "They pay for these investments out of revenues, and when their revenue goes down, they have to cut back."

Potential Opportunities

Despite these difficulties, the freight sector remains a vibrant market with numerous opportunities for engineering firms.

Matthis says railroads are allocating a lot of their project resources to freeing up system pinch points, locations where too many tracks converge and too many trains must pass.

Some of these projects may be relatively small, but many of them are huge. The largest project right now is the CREATE program in Chicago, where the railroads and public agencies will spend $1.6 billion over the next 20 years to upgrade rail infrastructure.

Along the East Coast, says Keating, "there are so many pinch points, and every one of them is a billion dollars."

Another "huge area of growth," according to Keating, is the expansion of U.S. ports. In anticipation of the completion of the wider Panama Canal in 2016, many U.S. ports along the East Coast have been aggressively upgrading their infrastructure to attract the larger container ships.

"All these ports have done their projections as to what the post-Panamax ships will mean," says Matthis. "There are immediate opportunities in all phases of port expansion—deeper waters, more bulkheads, more room to unload the ships."

Because most ports have a natural limit to their expansion—there's only so much shoreline—a third big opportunity is the planning, design and construction of intermodal facilities. "Inland ports," where shipping containers are offloaded from trucks and put onto trains, are springing up all along the East Coast.

"Our analysis shows that intermodal containers will be one of the strongest avenues for the freight rail industry over the next three years," says Matthis. "The ability to effectively and efficiently transfer freight from one transportation mode to another will become increasingly vital as we compete in the global economy."

Private Highway Funding

Despite the expectation that Congress will eventually pass a long-term highway bill, several firm leaders say that just as private funding has created a domestic freight rail system that is "the envy of the world," according to HDR's Goehri, it could do the same for roads that carry the bulk of the nation's goods.

According to Keating, before the 2008 recession derailed the plans, a private consortium was moving forward on a private eight-lane toll road that would have run from the Mexican border to north of Dallas.

"I think we may see that model going into the future in certain corridors," Keating says. "It may be the next generation of interstates."

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

House Clears Six-Year Transportation Bill

ASTERIX0597/GETTY IMAGES

ACEC helped advance a key legislative priority with the House vote to approve a six-year reauthorization of federal highway, transit and safety programs. The bill features an inflationary increase in funding over current levels and a number of important Council-backed policy reforms.

The House vote now sets the stage for conference negotiations with the Senate, with the goal of voting on a final program before the Thanksgiving holiday.

The House-passed bill provides $262 billion for highway programs over six years, including $242 billion in formula funds to the states, $4.5 billion for a new grant program aimed at improving freight mobility, and $1.2 billion for TIFIA loans and credit assistance. Annual state highway funding increases from $38.4 billion in F.Y. 2016 to $42.8 billion in F.Y. 2021.

Transit programs receive $68.6 billion over six years, including $55 billion in formula funds to state and local governments and $12.8 billion for capital investment grants. The bill also includes aggressive project delivery streamlining reforms backed by ACEC, as well as measures to promote technological innovation in the highway program, and multi-state pilot projects to test alternative revenue mechanisms such as mileage-based user fees.

The House also adopted a bipartisan amendment during the floor debate offered by Reps. Richard Hanna (R-N.Y.) and Sean Patrick Maloney (D-N.Y.) that urges the Secretary of Transportation to encourage state DOTs to contract out to engineering firms "to strengthen project performance, improve domestic competitiveness and create jobs."

In a key development, lawmakers adopted an amendment that would provide sufficient funds to sustain five or six years of funding under the bill. The Senate-passed DRIVE Act funds only the first three years.

"The investment levels in the House and Senate bills are nowhere near what they should be when compared to the enormity of our nation's needs," said ACEC President/CEO Dave Raymond. "But it's a long-awaited significant step forward, and will empower transportation agencies to get on with critical projects all across the country."

Congress Looks Ahead to Tax Extenders

Congressional tax writers are crafting legislation to extend a number of expired tax provisions of importance to the engineering industry. A package of 52 tax provisions expired at the end of December last year, including the R&D tax credit, bonus depreciation, higher expensing levels and energy tax credits.

In July, the Senate Finance Committee approved a two-year extension of the tax extenders. The legislation would be in effect for 2015, retroactive to Jan. 1, and 2016. Taking a different approach, the House has approved permanent extensions of the R&D tax credit, higher Section 179 expensing limits, and a provision improving access to the firm's capital for C corporations that convert to S corporations.

Although the final legislation could include a couple of permanent provisions, it is more likely to be a one- or two-year extension. Congress is expected to complete work on the tax extenders in December.

Reauthorization of the Export-Import Bank Passes House via Transportation Bill

The House of Representatives approved ACEC-backed legislation to reauthorize the Export-Import Bank of the United States for four years as part of a larger transportation package.

The Senate has already voted to approve legislation to reauthorize the bank through passage of its six-year surface transportation bill (the DRIVE Act), putting ACEC and other bank supporters in a strong position to secure this language in the final transportation bill that goes to the White House.

BILL CLARK/GETTY IMAGES

Rep. Stephen Fincher (R-Tenn.)

The week prior to the vote on the transportation package, Rep. Stephen Fincher (R-Tenn.) used a rarely employed legislative procedure to force a vote to extend the Export-Import Bank. Fincher's effort effectively bypassed House committee consideration and brought a reauthorization bill directly to the House floor, where it passed by a vote of 313-118. The vote, which included a majority of House Republicans, set the stage for including reauthorization language in the transportation bill.

During consideration of the transportation bill (H.R. 22), ACEC and its allies in the business community and in the House fought off 10 separate amendments to eliminate or weaken the bank's reauthorization provisions. Both the House and the Senate bills include ACEC-backed provisions to expand the scope of energy projects eligible for bank financing. Final passage of the reauthorization bill is critical, since currently no new export contracts can be signed with the bank.

Appeals Court Stops WOTUS Rule Nationwide

Judges from the 6th U.S. Circuit Court of Appeals in Cincinnati have put a nationwide hold on implementation of the controversial Waters of the U.S. (WOTUS) rule, which would significantly expand the federal definition of regulated wetlands. The decision builds on the August decision of a federal district court in North Dakota that blocked implementation of the rule in 13 states.

The appeals court observed that the Environmental Protection Agency and the U.S. Army Corps of Engineers attempted to make a "long overdue" clarification of jurisdictional lines over the nation's waters. But it noted that the "sheer breadth of the ripple effects" caused by the rule "counsels strongly in favor of maintaining the status quo for the time being." ACEC and a broad range of industry stakeholders raised a number of concerns about the proposed rule during its development. Opposition was particularly strong from organizations representing private client markets.

ISSUES ON THE MOVE	WHAT'S NEXT
Surface Transportation Bill	House-Senate conference to develop final package by Thanksgiving
Tax Extenders	To be included in year-end budget deal
House, Senate Energy Bills	Possible floor action in November/December

House Poised to Pass Larger Energy Bill; Clears Crude Export Bill

The House Energy and Commerce Committee passed ACEC-backed legislation that will expand energy markets, clearing the way for consideration by the full House.

The *North American Energy Security and Infrastructure Act of 2015* (H.R. 8) includes provisions to streamline energy project permitting to facilitate liquid natural gas exports and pipeline approvals; resolve environmental and grid reliability conflicts; improve grid security, with emphasis on protecting against cyber-threats, severe weather and electromagnetic pulse events; improve energy planning and coordination with Canada and Mexico; specify the near- and long-term roles of the Strategic Petroleum Reserve; and identify opportunities for optimizing energy efficiency and environmental performance through Department of Energy-funded Industrial Assessment Centers.

The Senate Energy Committee has also cleared a comprehensive energy bill, the *Energy Policy Modernization Act of 2015* (S. 2012), setting the stage for action later in the fall in both houses.

The full House also passed ACEC-backed legislation (H.R. 702) to end the decades-old ban on crude oil exports, although in the face of White House opposition, the measure's fate is uncertain in the Senate.

ROOTSTOCKS/THINKSTOCK

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INTELLIGEN

INSET: C.J. BUROTON; CHINAFACE/GETTY IMAGES

CE in Motion

Smart-vehicle technology prompts new intelligence in transportation infrastructure and opportunities for engineers

By Samuel Greengard

The automobile is undergoing a radical transformation. Advancements in technology, along with growing pressure to reduce congestion, trim carbon emissions and improve safety, are fueling the concept of connected cars and smart transportation systems.

Already, automated braking, lane-departure alerts, collision warning and adaptive cruise control systems are available in many vehicles. Meanwhile, Google's Self-Driving Car project has tallied more than 1 million miles without causing a collision. >>

Nissan's self-driving car makes a turn at an intersection.

THE ASAHI SHIMBUN/GETTY IMAGES

How these technological advances will impact America's roadways is a new challenge facing engineering firms. There's growing demand to develop smart infrastructure systems that do things such as alter traffic flow dynamically. Motorists are using apps, such as Google Maps and Apple Maps, to bypass congestion and incidents, but far more advanced vehicle-to-vehicle (V2V) communication and vehicle-to-infrastructure (V2X) systems lie ahead.

"There is a lot of research and development focused on automated and autonomous vehicles," says Matthew Schiemer, vice president of intelligent transportation systems at Gannett Fleming. "Although much of this technology is still well out into the future, there is no question that vehicles and driving will change over the coming years."

Industry leaders expect that change to provide significant business opportunities for engineers, according to the latest (3rd quarter/2015) *ACEC Engineering Business Index (EBI)*. Results show that "Smart Infrastructure/Smart Cities" was ranked No. 1 by Member Firm leaders (21 percent) among emerging markets they believe show the most potential for growth in the coming years, followed closely by "Renewable Energy Production, Transmission, Storage" (19 percent) and "Climate Change/Resiliency" (15 percent).

"When you change or eliminate reaction times, steering within lanes and other human factors, you can reengineer roadways to add capacity."

JOHN MOELLER
JOHNSON, MIRMIRAN & THOMPSON

Rolling Forward

It's no secret that the nation's highways are in need of technological advancements. According to an August 2015 study conducted by the Texas A&M Transportation Institute, U.S. drivers spent a collective 6.9 billion hours stuck in traffic in 2014. That equates to about 42 hours per year per commuter and collectively wastes $160 billion in time—approximately $960 per motorist. In addition, distracted drivers are a serious problem. Human error is responsible for 70 percent to 80 percent of all vehicle collisions, according to the U.S. Department of Transportation.

"It's very clear that we need to make infrastructure safer and more efficient," says Theodore Zoli, national chief bridge engineer at HNTB Corporation. "We need to make investments in smarter vehicles and transportation networks in order to maintain a functional transportation infrastructure and the desired quality of life."

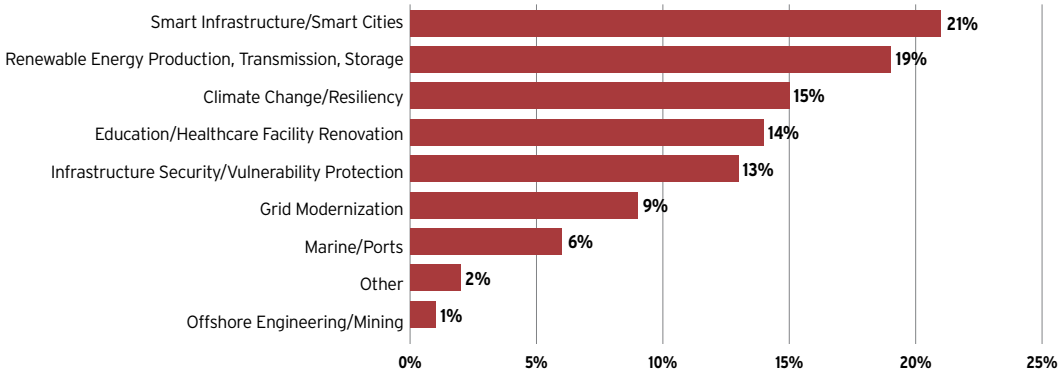
Automakers are leading the way. They're moving forward with systems that reduce human input, and the technology is rapidly evolving. Many high-end cars now use sensors to brake automatically if a driver approaches a vehicle too quickly or does not begin to slow at a stop sign. Other vehicles issue alarms and warnings if a driver veers out of a lane without using a turn signal.

General Motors is introducing Super Cruise in the 2017 Cadillac. It takes control of highway steering, acceleration and braking at speeds of up to 70 mph through the use of radar, ultrasonic sensors, onboard cameras and GPS. Mercedes-Benz has already demonstrated a fully autonomous concept car, while Volkswagen, Audi, BMW, Nissan and other manufacturers plan to introduce vehicles that, under good weather conditions, operate without driver input on rural roads and interstate highways. These systems will also apply the brakes or take control of the steering wheel when they detect danger.

The endgame is smarter infrastructure. Today's informatics systems, including emerging products such as Apple CarPlay and Android Auto, offer basic input about traffic and can suggest alternate routes based on current traffic flow and congestion. "This introduces a level of connectivity that hasn't previously existed,"

ILLINOIS TOLLWAY

Which of the following emerging engineering markets do you believe shows the most potential for growth?



Source: *ACEC Engineering Business Index (EBI)* third quarter, 2015 report

The Jane Addams Memorial Tollway (I-90) contains smart features designed by Alfred Benesch & Company that foretell the future of highways.

Automated cars will allow highway designers to narrow roadways and add more lanes.

says Laura McGovern, senior vice president at engineering firm Alfred Benesch & Company.

As a result, highway designers will need to integrate signals, roads and other infrastructure to create V2V and V2X networks. As McGovern puts it, "Bigger gains are possible when most or all cars on the road are connected and communicating with one another."

For now, the framework is largely under development, and the federal government is establishing rules, standards and protocols for V2V and V2X systems. These mesh networks will use dedicated short-range communications to communicate with vehicles at a range of 1,000 feet or about 10 seconds at highway speeds. Ultimately, motorists will receive information and warning messages via a visual display or audible alert. In addition to providing alerts when it isn't safe to enter an intersection or when a vehicle several cars ahead begins braking, these systems would deliver warnings at rail crossings or when black ice appears on roadways. Sensors in roadways or data from other vehicles could alert motorists before they reach an icy patch or a flooded intersection.

"It's very clear that we need to make infrastructure safer and more efficient."
THEODORE ZOLI
HNTB CORPORATION

What's more, data from these sensors and vehicles would stream into Traffic Management Centers (TMCs) that monitor and manage conditions and events in real time. This would allow a TMC to adjust traffic signals or lower or raise speed limits, for example. It could also help officials dispatch maintenance crews or snow plows faster and exactly where they're needed.

Highways of the Future

An Internet of cars would revolutionize how engineers design highways. "When you introduce connected and autonomous vehicles, it's possible to have cars drive at optimal speeds and distances and nearly eliminate collisions," says Dennis Motiani, executive director of the National Operations Center of Excellence. "A smarter transportation network is possible." This could mean developing urban transportation grids that function in a real-time, optimized way by adjusting for changes in traffic flow dynamically.

Immediate possibilities include greater use of reverse lanes, express toll lanes and dynamic lines that adjust to capacity. Interactive lighting could provide speed or weather guidance, while dynamic paint adjusts to weather and lighting conditions.

Further out, as more smart cars begin to eliminate human operation, cars will travel closer together, allowing engineers to add additional lanes to roadways by narrowing their width. John Moeller, president of Johnson, Mirmiran & Thompson, an engineering firm that specializes in transportation projects, says, "When you change or eliminate reaction times, steering within lanes and other human factors, you can reengineer roadways to add capacity."

V2X systems will also pull data, such as traffic volume and speed, from connected traffic signals, bridges and tunnels, and adjust the speed or route of other vehicles. These systems could also reduce vehicles' carbon footprint and improve safety.

The Illinois Tollway's 15-year, $12 billion program, "Move Illinois: The Illinois Tollway Driving the Future," will improve mobility, relieve congestion, reduce pollution, and link economies across the Midwest region.

ILLINOIS TOLLWAY

For instance, they might detect a boulder or mudslide and issue a real-time alert. Connected infrastructure and vehicles would also allow buses and trains to optimize schedules and even wait a few minutes longer during a traffic delay. They could also hold signals longer for older or disabled individuals.

At some point, when fully automated and autonomous vehicles roll onto roadways, highways may no longer need signs, signals and other physical information delivery systems. "The display in the automobile becomes the alert system," Moeller explains.

In fact, the future is beginning to take shape. For example, the Jane Addams Memorial Tollway (I-90) in Illinois contains a smart corridor designed by Alfred Benesch & Company that provides information about traffic, collisions and road conditions at half-mile intervals. The system uses road sensors and cameras to collect data and feeds the data to signs that can direct traffic. "If the system detects a crowded off-ramp, it may suggest an alternate exit," McGovern says. "The system will communicate with drivers and let them know when a bus is using an inside lane."

"The system will communicate with drivers and let them know when a bus is using an inside lane."

LAURA McGOVERN
ALFRED BENESCH & COMPANY

In Singapore, officials have tested a system that relies on induction loops in roadways to monitor traffic. The next phase of the system will add data from video cameras and taxi GPS systems to provide more precise data about traffic conditions. The same technology is now being used in Lyon and Montpellier, France. The traffic control algorithm relies on a number of key factors, including road category, density of traffic on the road, speed limits, and traffic and incident data to adjust stoplights.

Challenges Ahead

The biggest obstacles, for now, are establishing design and engineering standards to support connected vehicles and obtaining funding to build connected infrastructure. McGovern says that without clear and workable standards that span 50 states and even other countries, "the entire system starts to break down. National standards must exist for both auto manufacturers and motorists."

Funding is another challenge. Motiani says, "With infrastructure and transportation funding dwindling, tax revenues falling due to fuel-efficient and electric vehicles, and virtually no political will to change the current environment, there are still many more questions than answers."

In the end, transportation experts take a cautious but optimistic view. "We are seeing the technology advance and vehicles becoming more sophisticated, but the idea of widespread self-driving cars is still decades away," Schiemer says. "There are still too many technology concerns, infrastructure issues, policy and legal matters, and social issues to sort out."

Nevertheless, Moeller believes it's important for engineers to view connected transportation as an opportunity. "The reality is that vehicles and highway design have changed considerably over the last few decades. This is simply a continuation of the trend. At some point, connected vehicles and infrastructure will take shape." ■

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

SAMI SARKIS/GETTY IMAGES

Industry Drone Use Taking Flight

By Bob Violino

Unmanned aerial vehicles will change the way engineers work—if regulations can catch up to the technology

Unmanned aerial vehicles (UAV) or unmanned aircraft systems (UAS), commonly known as drones, are beginning to generate unique opportunities for the engineering sector. Though developed in the 1970s for the military, commercial use has lagged behind because of cost, regulations and specialized skills required to operate. But that is quickly changing. >>

In recent years, prices have dropped, key component parts such as batteries have improved, and software has advanced, all resulting in many new commercial and construction applications.

The only obstacles prohibiting more rapid utilization are the uncertain regulations governing commercial use of drones.

"UAS technology has advanced much faster than the regulatory framework," says Brian Wynne, president and CEO of the Association for Unmanned Vehicle Systems International (AUVSI), a nonprofit organization devoted to advancing unmanned systems. "Many businesses want to use UAS but remain grounded until the rules are in place."

The Federal Aviation Administration (FAA) has published draft regulations for small UAVs that fly within an operator's line of sight, and the agency is currently reviewing comments. Orrin (Mac) MacMurray, former ACEC chairman and now chairman emeritus of consulting firm C&S Companies, is representing the Council on an FAA rulemaking committee that is advising the FAA in its efforts to safely integrate drones into national airspace.

"Currently, use of UAVs is limited to hobbyists," MacMurray says, "unless the FAA issues what is known as a Section 333 exemption." Firms that want to use drone technology for a specific commercial purpose need to apply for and obtain such an exemption.

Final regulations on small UAVs will follow the review period, but the timing is unknown, MacMurray says. "It is expected that engineers will be allowed to use small UAVs for commercial use up to 500 feet above ground level without an exemption."

This will allow some engineering tasks to be done, such as flyover roof inspections of buildings under 500 feet, MacMurray says. "However, this will not allow many of the uses requiring altitude or flights beyond visual line of sight," he says.

A second rulemaking process has begun to address the use of drones beyond visual line of sight, and the committee on which MacMurray serves has met several times with the FAA. But no date has been set for draft regulations.

"Beyond visual line of sight is where the real high-value use of [drones] really is for

The AirRobot AR100-B UAS can be used in the most diverse and extreme environmental conditions for reconnaissance and inspection.

COURTESY OF AUVSI

Woolpert uses the Nova Block III from UAS manufacturer Altavian for surveying and mapping collection.

COURTESY OF WOOLPERT

many industries, including engineering," MacMurray says. "It is here, for example, where one could program a UAV to fly with a heat sensor down a power line and check for hot spots without having to visually see the UAV."

Drones in the Field

The uncertain operational environment of drones makes investing in the technology a risky prospect for firms.

But that ambiguity hasn't discouraged several engineering firms from starting to use drones. The FAA has approved nearly 1,500 Section 333 exemptions to date, and requests are far outpacing approvals. "So there is clearly a growing appetite for UAS technology," Wynne says.

Woolpert was one of the first engineering firms in the nation to receive a Section 333 waiver and has since focused on UAS testing, product development and data integration, says Layton Hobbs, vice president and director of technology and development at Woolpert.

The firm is focused on how drones will benefit its core service offerings, including engineering and geospatial technologies. "We've completed several mapping and imaging-related projects this year using UAS," Hobbs says.

Woolpert clients are interested in the use of drones for construction site monitoring in support of the company's traditional construction inspection services.

"Fundamentally, the benefit of UAS is its ability to attain and record a broad perspective of features, movements or changes on the ground," Hobbs says.

The use of drones will supplement these capabilities by allowing a small team to deploy a mapping or imaging system over much smaller sites than were economically feasible in the past, Hobbs says. "And because we can revisit the site daily or even hourly, we can track change at a level not possible with traditional manned systems—for example, when monitoring a major phase of building or site construction," he says.

The industry "has always adapted or even led in the development of 'measurement' technology for its business cases," Hobbs says. "GPS, laser range finders, remote camera and CCTV systems, roadway scanners, chemical and flow monitors—these are all examples of high-tech systems we use every day in our work. UAS will, eventually, be just another tool in the toolbox."

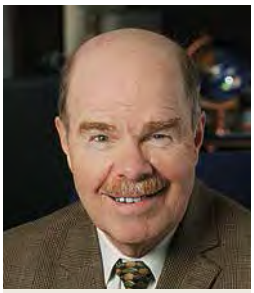
"GPS, laser range finders, remote camera and CCTV systems, roadway scanners, chemical and flow monitors—these are all examples of high-tech systems we use every day in our work. UAS will, eventually, be just another tool in the toolbox."

LAYTON HOBBS
WOOLPERT

Unlimited Potential

Christian Stallings, a certified photogrammetrist at McKim & Creed, says his firm has received FAA approval to fly three different UAV models. The firm plans to have a team travel from project to project throughout its service areas, with licensed pilots operating the systems.

"Once the FAA creates a written exam for small UAVs, we plan to train our survey teams and have an internal training and safety program so that it becomes a standard service and tool for each survey team," Stallings says. Potential uses for these systems include infrastructure inspections and creating 3D elevation information for landfills, quarries and other small sites.



"Imagine being able to inspect a bridge without lane closures or fly along the route of a buried gas line sensing for leaks. If you can think of it, this technology will affect it in some way."

ORRIN (MAC) MacMURRAY
C&S COMPANIES

"We find that potential applications from this tool complement many of our existing services and in many cases provide a more cost-effective way to provide products," Stallings says. "For example, surveying stockpiles using traditional survey or terrestrial scanners used to take a few days, but now we find that we can create the same products in a day and hope to speed that up even more utilizing near real-time cloud processing in the future."

McKim & Creed plans to add more drones in the future and is evaluating whether it makes more sense to do all of its own acquisitions or to contract with other firms. "Ideally, we want to create value-added products that meet our clients' needs in a timely manner at the highest quality," Stallings says. "What makes the most sense to achieve that goal today may not be true tomorrow."

The great thing about the technology "is that it's a means to get some type of sensor payload in the air, ground or water to collect information," Stallings says.

Engineering and construction companies will use these vehicles for surveying, taking aerial photos of sites and performing inspections of all types. MacMurray says, "Imagine being able to inspect a bridge without lane closures or fly along the route of a buried gas line sensing for leaks. If you can think of it, this technology will affect it in some way."

There are many other promising applications for the technology, MacMurray says. "Uses are limited only by one's imagination and the development of the technology itself."

Challenges Ahead

As the use of drones advances, it can become easy for a company to get caught up in the latest trend without evaluating a system based on what makes the most sense for its business.

Stallings says firms need to assess how rapidly drone software and hardware is changing and determine what new technology best benefits their customers. "For us, high-dollar drones and sensors deployed to map small site projects don't make a lot of sense for our current program," he says. "We have been careful

to select technology we can use to create comparable products for a lot less investment and pass that savings to our customers."

This also positions the firm to regularly reinvest in new systems as the industry evolves. "This is the real advantage of drones," Stallings says. "Educating our clients and understanding their needs is important in understanding what technology best fits our program."

Firms will need to determine which types of drones best meet their needs. "UAS platforms come in many different shapes and sizes," Wynne says. "The best UAS for a particular application will depend on a variety of factors." AUVSI maintains a product database to help companies looking for a platform, he says.

Internally, Woolpert is working through several challenges in how data collected from the systems should be stored, processed and cataloged. "There is still plenty of work to be done in these areas as we come up with new and exciting applications of the technology," Hobbs says.

"We see this technology as limitless," Hobbs says. "Woolpert has a robust history of engineering, mapping, surveying, data collection and analysis—and all of these will be enriched with the use of UAS. We're just beginning to realize all that can be done." ■

Bob Violino is a business and technology writer based in Massapequa Park, N.Y.

Christian Stallings and Rob Crawshaw from McKim & Creed use a 3DR Solo drone to inspect a bridge.

COURTESY OF MCKIM & CREED

BIM, Productivity, and Quality Control

A synopsis of the ACEC Fall Conference presentation, "Delivering On The Promise Of BIM"

Allen Preger
Newforma cofounder and vice president

Michael O'Toole
WSP Parsons Brinckerhoff associate

It was the size of the Revit models that prompted the change.

They were simply too big to upload and download. Transfers took too long, and the stakes were too high in the event someone worked from an outdated file.

Instead, the collaborators implemented a way to share files automatically, on a schedule, without manual intervention.

The project is the New Balance headquarters in the Brighton neighbourhood of Boston. The collaborators are WSP Parsons Brinckerhoff, John Moriarty & Associates, and Elkus Manfredi Architects. And the file-sharing technology they're using is saving time as it reduces the risk of lost quality.

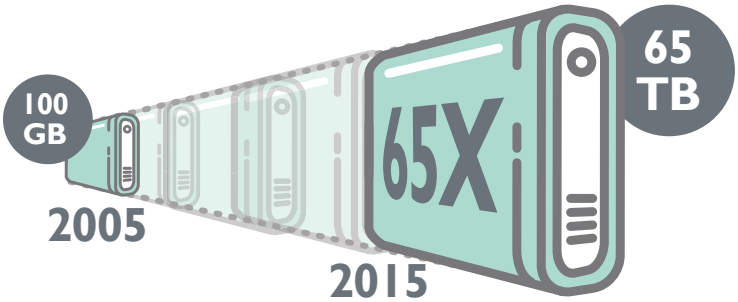
BIM offers great benefits, but it brings new risks.

Design and construction teams are overwhelmed with information. And BIM has had a lot to do with it.

With 3D modelling, you can now batch-generate thousands of 2D drawings, details and specs with the press of button.

And with dozens of discipline-specific, information-rich 3D models on a project, your teams are challenged with managing unprecedented amounts of information in rapidly iterating versions.

How much has project information really expanded?



In 2005, the largest project we were aware of had 100+ gigabytes of information. Ten years later, we have a customer using our products to manage over 65 times more data – 6.5 terabytes – on one project.

BIM is not the only contributor to information overload.

Even if you're not using BIM, you're buried in project information: Marked-up documents, meeting minutes, action items, and endless amounts of email.

All this info contains decisions essential to the project record.

Collaboration is mandatory

To get the most out of 3D modeling, at the very start of the project you need to get input from all the project stakeholders: engineers, consultants, contractors, subs, trades, suppliers, facility managers and others. In the past, this input came too late to benefit the built structure. Now the ideal is build the project virtually before breaking ground physically.

How WSP, Moriarty, and Elkus Manfredi did it.

The solution used by the WSP team is by Newforma. Among its features is the ability to create direct Newforma-to-Newforma connections to share files being used jointly.

In addition to automatically sharing files such as BIM models, the feature transfers action items, requests for information, submittals and other information.

Now, no time is wasted uploading and downloading files. Shared information need not be entered twice. And teams are assured of always working with the most current information.

Audit trails with links to record copies provide transparency and accountability.

Solving problems like these – and making you more successful – is Newforma's business. To learn how we do it, visit our website. Or phone us to speak to a representative who specializes in your region and industry.

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BACK TO LIFE

PROJECT:
Historic Santa Fe Train Depot
Ft. Madison, Iowa
FIRM: Klingner & Associates
Quincy, Ill.

PROJECT:
Rolling Hills Wetland and Little Chatata Creek Restoration
Cleveland, Tenn.
FIRM: S&ME, Inc.
Raleigh, N.C.

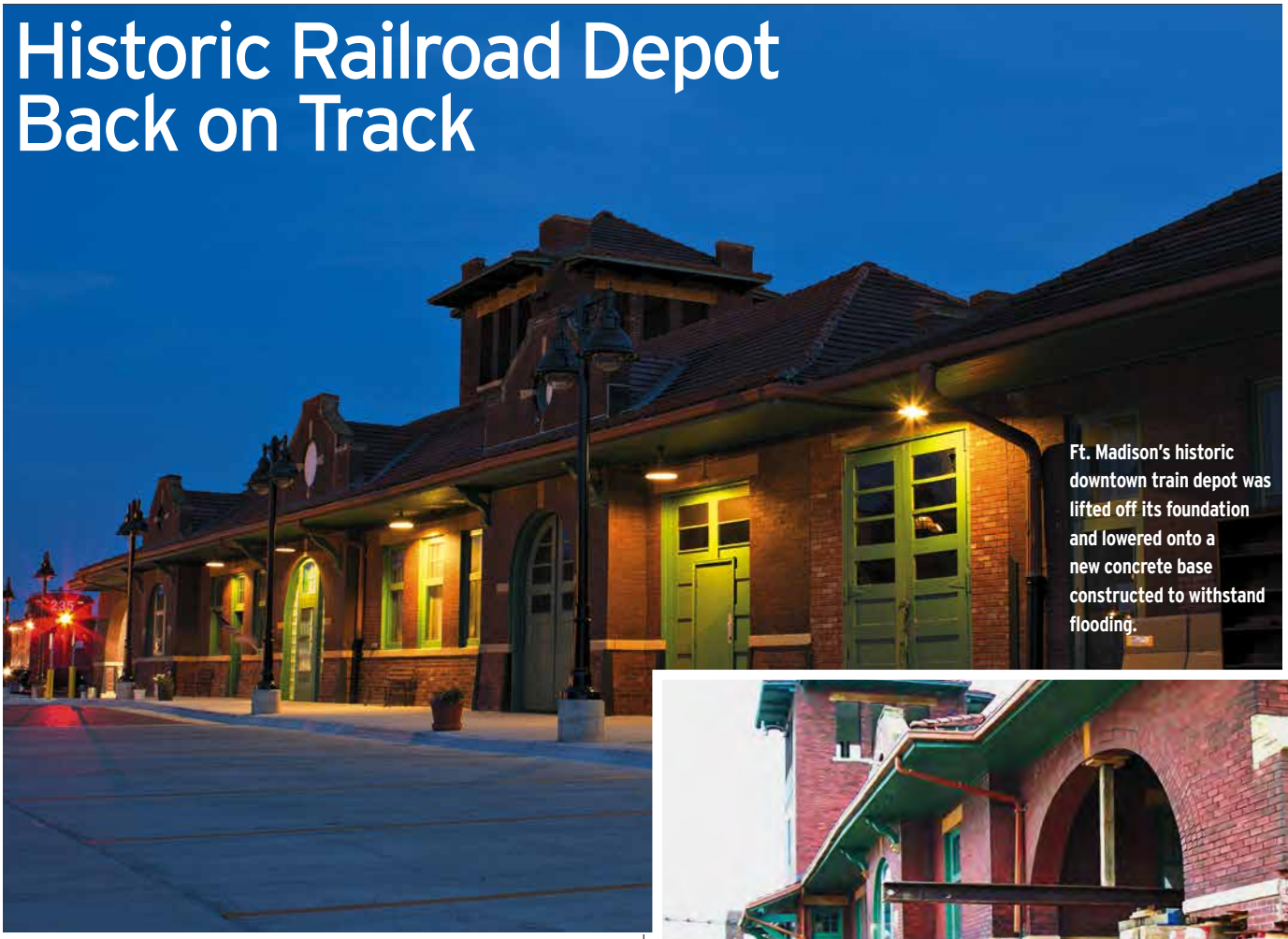
PROJECT:
University of Minnesota Northrop Auditorium Renovation
Minneapolis, Minn.
FIRM: Meyer Borgman Johnson
Minneapolis, Minn.

PROJECT:
Zedler Mill Dam Restoration
Luling, Texas
FIRM: Freese and Nichols, Inc.
Austin, Texas

Member Firms restore historic and environmental properties >>

By Darlene Bremer

Historic Railroad Depot Back on Track



Ft. Madison's historic downtown train depot was lifted off its foundation and lowered onto a new concrete base constructed to withstand flooding.

PROJECT: Historic Santa Fe Train Depot, Ft. Madison, Iowa

FIRM: Klingner & Associates, Quincy, Ill.

Stephen Wavering

Established as a military post in 1808, the city of Ft. Madison became a major rail hub in the 19th century when the Santa Fe Railway constructed a bridge over the Mississippi River. The original Santa Fe Railroad Depot was built in 1888, and over the years, the complex expanded to include a Railway Express Agency building and freight office. But by 1968, the historic railway depot was no longer in use.

In 2007, the city hired Klingner & Associates to rehabilitate the downtown depot so that it would once again be an operational passenger train station. "The town's goal was to create a showpiece to attract visitors and provide economic development opportunities for the city," says Stephen Wavering, the firm's chief financial officer.

Klingner led the design for the four-phase project. The first phase, in 2011, raised the complex's three buildings by four feet, above the Mississippi River's 500-year flood elevation. In 2012, during phase two, the surrounding site was raised to the same level as the buildings. In addition, the interior of the main depot building was remodeled with terrazzo floors, upgraded lighting and a new HVAC system. "The renovation was designed to maintain the historic ambiance of the facility and its 1945 art deco interior look," Wavering says. The final phase, scheduled for 2016, will include constructing a 1,000-foot concrete platform along the tracks that will feature retaining walls, period lighting, signage and landscaping.

Raising the century-old buildings without damaging the brickwork presented Klingner with an extensive challenge. "After researching various alternatives, we developed a plan that included constructing a temporary steel gridwork on which the buildings were jacked in 18-inch synchronized increments," Wavering says. Maintaining the historic integrity of each building structure was another challenge. "By closely coordinating design efforts and construction processes with the Iowa Historical Preservation Office, we were able to ensure that the buildings could be successfully renovated and made operational without damaging their historic components."

Wetlands Relocated After Being Displaced by New Jetport

PROJECT: Rolling Hills Wetland and Little Chatata Creek Restoration, Cleveland, Tenn.

FIRM: S&ME, Inc., Raleigh, N.C.


Liz Porter

When Cleveland, Tenn.'s airport could no longer support the area's general aviation demands, a new jetport was built. However, the jetport displaced a local wetland, and environmental regulations required the city to relocate the wetland and mitigate the impact to a nearby creek.

In 2006, S&ME provided a baseline jurisdictional of the wetland to state and federal agencies. Subsequent environmental services for the project included permitting of the stream and wetland impacts, engineering design and construction oversight.

Many factors contributed to the project's complexity, including adverse geologic conditions, flood design restrictions and strict new regulations for construction stormwater monitoring. "To overcome these issues, we balanced compliance and collaboration between the many regulatory agencies, consultants and other stakeholders," says Liz Porter, national resources department manager and vice president for S&ME.

Ken Barry, technical principal for S&ME, says one major challenge was finding a suitable, available mitigation site away from the jetport that would minimize wildlife attracted to the jetport and receive the support of the community. The final mitigation was performed approximately five miles from the jetport at a site that was part of a former golf course situated between two streams. "We assessed the site for its potential, prepared engineering plans for managing hydrology and establishing appropriate plantings on the site, and worked closely with the city to obtain neighborhood acceptance of the mitigation plan," he says.

The jetport opened in 2013, but S&ME will remain involved until 2022, conducting long-term monitoring of the 21-acre Rolling Hills Wetland restoration site and the half-mile relocation of the Little Chatata Creek to ensure regulatory compliance.

The project demonstrates that unique jetport requirements, which include limitations on tree height and wildlife attraction, can be incorporated into a mitigation plan while still returning adequate stream restoration and other ecological improvements to the community.


S&ME will continue to monitor a 21-acre wetland restoration site and half-mile creek relocation, displaced by construction of Cleveland's new jetport.

Major Makeover for Antiquated Auditorium

The University of Minnesota's Northrop Auditorium reopened in 2014, following a three-year interior renovation that preserved its historic elements.

PROJECT: University of Minnesota Northrop Auditorium Renovation, Minneapolis, Minn.

FIRM: Meyer Borgman Johnson, Minneapolis, Minn.

Murphy Curran

The University of Minnesota's giant steel Northrop Auditorium, originally built in 1928, had become acoustically abysmal. As part of a revitalization drive, the university decided that, rather than paying the economic and environmental costs of demolishing an outdated but nostalgia-rich facility, it would repurpose the building into a world-class performance facility with much-improved acoustics. The project included a redesign of the perimeter classroom space for public study and other academic and theater programs.

As the structural engineer of record, Meyer Borgman Johnson (MBJ) first had to stabilize the building's exterior, which it did between 2005 and 2008. Renovation design followed in 2008, construction began in 2011, and the performance hall opened in 2014. MBJ's scope of work included designing and rebuilding the auditorium, evaluating and reinforcing the roof structure, building an addition and designing additional floor space on every level of the building. "We had to reinforce trusses in place that are up to 70-feet above the floor level; build new trusses over the stage opening to support new, higher loads; and create internal structural trusses to extend the stage into a new addition," says Murphy Curran, MBJ's director of business development.

Since almost no area of the building was untouched by the renovation, the project required extreme design flexibility and modifications. To meet these challenges, the company used a wide variety of structural systems, such as post-tensioned concrete in the auditorium, structural steel reinforcement and new steel roof trusses, composite steel construction for additional floors, load-bearing concrete walls and precast concrete in the building addition, and micropile foundation reinforcement to support the new stage. "We had to design these systems so that they could be constructed through a 13-foot-wide hole made in the north end of the building, because it was imperative to the university that the exterior structure remain intact," Curran says.

Six years after the initial design began, the 176,000-square-foot auditorium and new performance hall once again is a keystone of the university's campus and will host graduations, concerts and dance performances for generations to come.

Troubled Dam Shored Up

PROJECT: Zedler Mill Dam Restoration, Luling, Texas

FIRM: Freese and Nichols, Inc., Austin, Texas


Dustin Mortensen

When Fritz Zedler constructed a mill on the banks of the San Marcos River in 1874, he built a stone dam and a wooden dam to provide water and power to the mill. A concrete dam replaced both of these original structures around 1914. The mill has been inactive since the 1950s, but today it, along with an adjacent park, provides a popular recreational space and event venue.

In 2008, the city of Luling became concerned about the Zedler Mill Dam after a similar dam built by the same company six miles downstream failed. The city hired Freese and Nichols to restore the aged structure. Dustin Mortensen, project manager in the company's Central Division Water Resources Group, says, "Saving the dam fulfilled several goals." A water treatment facility just upstream required water from the dam-formed lake as the intake for its treatment process, and the town wanted to preserve the environmental and historic features of the mill and surrounding buildings to help maintain the character of the area and attract visitors.

As the project's prime engineering consultant, Freese and Nichols conducted surveys and geotechnical borings to determine soil conditions, performed stability analysis, developed mitigation solutions, developed the restoration design, and oversaw the construction process. "Construction began in April 2014 and was completed seven months later," Mortensen says.

Assessments were severely hampered by the lack of historic documentation. "We overcame this challenge by performing as much investigation as access allowed," Mortensen says. Analysis consisted of visual observations, including dive inspections to determine what design parameters would be required. Dive reports revealed that the sandy clay soil foundation was undermined, wooden support timbers were not in contact with the dam concrete, and under-seepage was extensive. "It was decided that these problems would be solved by installing 37 micropiles as the new foundation and by grouting underneath the dam to fill voids in water erosion areas," he says.

Working closely with the Texas Historical Commission, Freese and Nichols obtained approval for the proposed site changes while maintaining the historic appearance of the dam. ■


The Zedler Mill Dam restoration project was awarded a Public Works Project of the Year for preserving the environmental and historic features of a structure built in 1914.

By Calvin Hennick

ECONOMIC POWER

Employee Engagement

A grant from the HDR Foundation enabled Green Empowerment to provide water to impoverished communities in Nicaragua.

HDR employees traveled to Nicaragua with Green Empowerment and helped install a solar-powered water pump in the village of El Jocote.

COURTESY OF GREEN EMPOWERMENT

OF

HDR employee charitable spirit means dollars and time for worthy causes

In early March of this year, Eric Keen—vice chairman of HDR, Inc., and president of HDR Engineering—woke up in the middle of the night in his hotel room in Australia for a video-conference with communications manager Nichole Andersen to check on the status of an important project back in the U.S.

The company wasn't wrapping up work on a new development or trying to lock down a big client. Instead, Keen was excited to see how much progress had been made on the company's first "Day of Giving," an effort to raise money for the HDR Foundation. >>

Keen had spearheaded the creation of the foundation in late 2012 as a way to help employees pool their resources for worthy causes, and the organization gave out some $150,000 in grants in each of its first two years. But much of the early giving was driven by senior leadership, and the foundation at first remained something of an abstract concept for many of the firm's employees, who were accustomed to directly donating their time and money to charities.

"When we started, the participation levels were pretty small," says Keen. "I said, 'We should not feel bad about that.' Until you start to show some results and how the foundation will impact our communities and how it will engage our employees, we can't expect a whole groundswell of support."

The Day of Giving was a chance to create that groundswell. During the foundation's first two years, around 340 employees donated, and Keen hoped to nearly triple that number to 900 donors in the span of 24 hours. It was an ambitious goal, to be sure, but Keen was hopeful as he waited for Andersen's update.

The news was good—the company hit its goal before the middle of the U.S. workday. But even with the mission accomplished, Keen couldn't go back to sleep in Australia. He now was too excited.

By midnight in the States, nearly 1,500 HDR employees had donated more than $450,000—more in a single day than in the entire previous two years combined.

"It was really amazing," says Andersen. "We had no idea what kind of response we were going to get from our employees, and they just came out en masse. It was really fun to see."

"The goal was presented as numbers. But it was really about engaging our employees and getting them excited about the possibilities of what we can do, and then knowing that that engagement would have a real impact across our communities."

ERIC KEEN
HDR, INC.

"The goal was presented as numbers," says Keen. "But it was really about engaging our employees and getting them excited about the possibilities of what we can do, and then knowing that that engagement would have a real impact across our communities.

"Now we have a responsibility to make good decisions about how those dollars will be spent," he says.

Employee Involvement

Julie Jessen, a public involvement manager in HDR's Anchorage, Alaska, office, helped Keen get the foundation off the ground and has served as chair of the employee-run grant-giving committee. While other firms also have their own charitable arms, Jessen says the level of employee participation at the HDR Foundation is "pretty unique."

"We are employee-owned, and there's a high sense of ownership and connection to HDR," Jessen explains.

The firm matches up to $300,000 in employee contributions to the foundation per year and also allows workers to donate the cash equivalent of their unused vacation hours. The foundation focuses on three firm and employee priorities: health,

Lynx Robotics participants compete in robotics contests.

COURTESY OF HDR

HETRA provides equine-assisted therapeutic sessions for veterans.

COURTESY OF HETRA

Grant Recipients

In 2014, the HDR Foundation awarded three "large" grants (more than $15,000) and six "small" grants (under $15,000) to organizations throughout the nation, including these five:

Green Empowerment, Portland, Ore.
The grant will support project equipment costs and local engineering for an organization that provides renewable energy and water systems to impoverished communities around the world. More than 25 HDR employees volunteered with the group on a solar irrigation project in Nicaragua.

Lynx Robotics, Council Bluffs, Iowa
Funds will help the organization purchase additional robots and increase the number of students involved on a competitive robotics team.

Heartland Equine Therapeutic Riding Academy (HETRA), Gretna, Neb.
Grant money will be used to improve HETRA's facility. HETRA provides equine-assisted activities to adults and children with a variety of challenges, such as cerebral palsy, autism and post-traumatic stress disorder.

City Blossoms, Washington, D.C.
Grant money will help the organization create and maintain "kid-driven" green spaces throughout the nation's capital and increase programming at two formerly vacant lots that now provide free produce and culinary education to residents.

Bridges to Prosperity, Denver, Colo.
Funds will be used to create bridges in communities in Nicaragua.

education and the environment. Nonprofits need an internal employee sponsor to apply for grants, and the foundation gives strong preference to organizations with HDR employee involvement. When applications are unsuccessful, someone from the foundation lets the employee sponsors know why.

"This truly is employee-driven," Jessen says. "The more I meet the people that volunteer for this, the more we talk about it; there is certainly a high level of interest and excitement."

Jean Hansen, a sustainable interiors manager at HDR, who sponsored a successful grant for the Center for Environmental Health, says that the high level of employee involvement makes the foundation feel especially relevant and personal to employees. "It's really exciting when the company that you work for can help support an organization that you know is doing really fabulous work," Hansen says.

Josh Krayger, a strategic program manager at HDR, who chaired the foundation's grant-giving committee for a year, says he "didn't fully understand" the foundation when it first started. But he's since embraced the concept.

"Donating what I can to a soup kitchen in my local community is great and has an impact," Krayger says, "but the idea that you can pool your resources and make a

Approximately 300 people who live in the village of El Jocote no longer have to walk over a half of a mile carrying water jugs to obtain potable water.

COURTESY OF GREEN EMPOWERMENT

Salish Sea Expeditions crew members and students deploy a Niskin bottle. Grant money from the HDR Foundation will fund additional scientific equipment.

COURTESY OF SALISH SEA EXPEDITIONS

huge impact on an organization is really cool."

Both Jessen and Krayger stress how much effort employee volunteers put into the grant-making process. "It was really difficult," Krayger says about choosing between different organizations. "The applications were so diverse. It was everything from homeless shelters to conservation to high-school students who were interested in robotics and STEM work. We especially gave credibility to organizations that HDR employees had contributed to in the past."

Krayger says that the application that most "touched my heart" came from a Colorado organization called Sweet Dream in a Bag. The group provides new bedding and toys to children transitioning out of temporary housing. "There was a need for it, and it was really cool to learn a little bit about them," Krayger says.

"The thing I find wonderful is the level of discussion at our committee meetings," Jessen says. "Each and every person really looks at these requests and asks some really good questions. Certain proposals just tear at your heartstrings. This is not a rubber stamp by any stretch of the imagination. It's hard."

Making an Impact

Brad Shinn, a strategic pursuits leader in HDR's Seattle office, became involved with Salish Sea Expeditions when a representative from the group explained the program at a staff meeting. The nonprofit organization helps students develop critical thinking and creativity through scientific research on Puget Sound.

"It struck a chord with me," Shinn says. "In our industry, we talk about having a shortage of engineers. We talk about having a shortage of women in engineering. Yet I feel like as an industry, we don't do very much to address that at any kind of systemic level."

"The idea that you can pool your resources and make a huge impact on an organization is really cool."
JOSH KRAYGER
HDR

Shinn sponsored a grant application for Salish in 2013. It didn't get funded. Then, in 2014, he sponsored another application, with the same results.

"My job as a pursuit leader is to come into a project team and help them win a project," Shinn says. "I'm kind of a competitive guy. It's my job to win. That's what I do. So when we didn't get the first grant, I was like, 'What? How did this happen?' I wanted to do a debrief and figure this out."

Shinn sat down with members of the grant-giving committee to learn more about what the committee was looking for. This year, the foundation finally awarded Salish a $15,000 grant to help outfit a new vessel with state-of-the-art scientific equipment.

Seth Muir, executive director of Salish, calls the grant "a huge nod of approval" and says that Shinn really "gets" what his organization is trying to do. "This is going to enable us to gather professional-quality, irrefutable data that we can compare and contrast with the data students gather by hand," Muir says.

Shinn sees a dual benefit to the foundation: It helps out organizations in the communities where HDR works, while also amplifying employee efforts.

"From an employee standpoint, it's nice because the company is saying, 'We value what you value, and we want to support that,'" Shinn says. "And as a company, when we say we're involved in our communities, you can't say it any stronger than that. I think it's smart on a lot of levels." ■

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

CONSTRUCTING WITH CARE

ECS has had the honor to work on high profile, challenging projects; including a large multi-phased hospital expansion project in Atlanta, GA. This healthcare system is an industry leader in research and treatment making it an invaluable medical resource that extends well beyond the state of Georgia.

Employee Spotlight

"I may not be in the profession of performing life-saving procedures, but it sure feels good knowing that our efforts will allow someone else to do so."

- J. Doug Coffey, Jr., PE
CMT Department Manager

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2015 ACEC Outstanding Young Professionals of the Year

At this year's Fall Conference, ACEC presented five engineers with 2015 Young Professional of the Year Awards. The recipients were selected by the College of Fellows for their outstanding contributions to the engineering profession in the early stages of their careers.

Juan Osorio

Langan Engineering & Environmental Services
Elmwood Park, N.J.

Juan Osorio, 30, is a civil engineer involved in commercial, residential and institutional projects in New York, New Jersey and Nevada. As an integral part of the development of the award-winning Franklin D. Roosevelt Four Freedoms Park, he was responsible for the site design as well as preparation of coastal storm and shoreline protection analyses. He is currently leading a team to develop a mobile application to streamline data collection and report preparation for evaluating Americans with Disability Act compliance.


Juan Osorio

Dennis Hymel Jr., (right) helps members of the Paulina Fire Department in Louisiana rescue a woman from Hurricane Isaac floodwaters.

Dennis Hymel Jr.

T. Baker Smith
Thibodaux, La.

Dennis Hymel Jr., 29, is a civil engineer currently working on several new bridge initiatives in the preliminary project development stages and is supporting the design and field effort for the Tiger Bridge Replacement Project. He is also spearheading his firm's effort to solve flooding problems in St. James Parish, after personally spending days filling and delivering sandbags, constructing ring levees and assisting the Parish Emergency Operations Center following Hurricane Isaac.

William Billiet

Schnabel Engineering
Baltimore

William A. Billiet, 30, is a geotechnical/civil engineer responsible for designing foundations for buildings, bridges and dams. For one of his most recent projects, he served as the project geotechnical engineer for the Dulles Metrorail Project, an 18-mile Metrorail extension in Northern Virginia. In 2012, he traveled to Nigeria to lead a large subsurface exploration for a future petroleum facility in a remote jungle. Also active in his local community, Billiet delivers STEM presentations to local high school students.

William Billiet inspects a mechanically stabilized earth wall in Montgomery County, Md.

Jessica Garcia

Jessica Garcia

Clanton & Associates, Inc.
Boulder, Colo.

Jessica Garcia, 29, develops options for how to integrate large energy-consuming systems into the intelligent, modern and reliable electricity infrastructure that is the smart grid. She has managed the analysis of street lighting demonstrations for a number of major urban areas and has expertise in exterior lighting control systems. A strong advocate for women in engineering, Garcia, who now works for a women-owned engineering company in Colorado, was chosen by *National Engineers Week* to represent ACEC in the annual "New Faces of Engineering" feature published in *USA Today* this past February.

Corin Marron

ARCADIS
Tucson, Ariz.

Corin Marron, 30, works in the field of potable water reuse to bring renewable, high-quality drinking water to two Southwest communities facing long-term drought. She makes critical contributions in the areas of master planning, water quality assessment, conceptual design of advanced water treatment facilities, and team coordination. Marron also volunteers with Water for People, a humanitarian organization dedicated to providing safe drinking water to people in developing countries.

Corin Marron (center) and Pedal with Purpose team members participate in a fundraiser for innovative water, sanitation and hygiene solutions in developing nations.

Market Driven

ACEC Coalitions provide specialized resources and networking to help members address specific market development and business management challenges

By Stacy Collett

ACEC's six coalitions—dedicated communities of ACEC members organized by practice area or firm size—provide a wide range of practical, day-to-day resources and best practices for the unique needs of each field. While the groups share some challenges, each discipline also faces its own unique concerns in the coming year.

In this special *Engineering Inc.* report, coalition leaders offer their insights and projections on current challenges and future opportunities for their specific industry discipline.

Council of American Structural Engineers (CASE)
Chairman: David Mykins
Member Firms: 143
Mission: *Improve structural engineering firm success by reducing claims, increasing profitability, improving quality and enhancing management practices.*

David Mykins

The growing use of public-private partnerships (P3s) is a positive dynamic for structural engineers that will lead to business growth in 2016, says CASE Chair David Mykins, president of Stroud Pence in Virginia Beach, Va.

"Previously, P3s were used only on large projects, but we're starting to see them a lot more, even on the local level for schools and municipal buildings. That's becoming an opportunity for our members."

Still, he says that CASE members are hampered by short code cycles that they would like to see extended to six years. Health care is also an issue. "Health insurance costs continue to hit us on the bottom line," Mykins says. "There's a lot of pressure in the marketplace to keep our fees down, yet our soft costs keep

increasing, and health care is one of the main line items on our firms' budgets."

Mykins believes that the economic downturn of four to five years ago discouraged many college students from entering the engineering field, and that slump is now impacting Member Firms. "We're starting to feel a little bit of that drain on new graduates as well as midlevel positions," he says. "Those who stayed in the industry and remained with their firms are now considered the cream of the crop, and folks are doing whatever they can to keep them."

He remains optimistic for the industry in 2016—as long as the economy keeps chugging along, he says. "The economy is definitely improving, and that rising tide is floating all boats."

Land Development Coalition (LDC)

Chairman: Mark Borushko
Member Firms: 71
Mission: *Strengthen the land development business environment with an emphasis on quality services in the global marketplace.*

Mark Borushko

LDC Member Firms are also facing staffing challenges, particularly at midmanagement levels. "Over the last seven years, aspiring civil engineers who were graduating from college but weren't able to find a job either went off to do something else or didn't get the experience we would like them to have in a normal market," says LDC Chair Mark Borushko, vice president and general manager at David Evans and Associates, Inc., in Phoenix.

Yet those same millennials at the center of the skills shortage are also driving most of the coalition's optimism for 2016. "The millennial generation is starting to come into its own and starting to drive demand for housing and retail," Borushko notes. "After years of living an urban lifestyle or maybe still living with mom and dad, they're now going off on their own, getting jobs and being able to afford certain things."

Similarly, the needs of the baby boomer generation are changing. "As those two cohorts continue to evolve in the marketplace, the demands for types of land uses are going to continue to change to where there are going to be new types of housing, health care, retail and entertainment," Borushko says.

The return of single-family home building would most benefit land developers in 2016. Borushko says, "Greenfield development, which creates the need for roadway extensions, sewer lines, waterline extensions—requiring all the services that we provide as a civil engineering industry—will be the biggest game changer for us."

Council of Professional Surveyors (COPS)

Chairman: Ralph Guida
Member Firms: 116
Mission: *Provide Member Firms best practices in geomatics, primarily in the form of products and information on legal issues and government affairs.*

Ralph Guida

To combat the declining number of surveying professionals, COPS plans to help revamp the image of today's modern surveyor. "We need to re-image ourselves as high-tech and creative, not just people crunching formulas and numbers and grinding out in the dirt," says COPS Chair Ralph Guida, president of Guida Surveying in Irvine, Calif. "We are looking at how to show a new image: [surveyors] flying unmanned aerial vehicles (UAVs) and creating images that show the public what the future is going to look like on a subdivision or development."

Technology is revolutionizing the way surveyors provide services, Guida says. Drones can be now used for aerial mapping. "They will improve our productivity and product at a very cost-effective rate," he says. Drones also help keep surveyors out of harm's way by flying over highways, for instance, but laws must be passed allowing them to be used in these areas.

Surveyors are also anticipating growing opportunities in 2016 thanks to a recovering housing market. Guida says, "A rebound in the housing markets will create demand for more of our traditional surveying, such as construction staking and mapping of new subdivisions and lots."

Council of American Mechanical and Electrical Engineers (CAMEE)

Chairman: Kevin Peterson
Member Firms: 79
Mission: *Help members serve their clients and run more effective and efficient businesses.*

Kevin Peterson

CAMEE represents a diverse group of firms. Some work with architects on buildings in vertical markets, while other firms focus on government infrastructure projects. "On the building side, business is better [than this time last year], but it's still not great," says CAMEE Chair Kevin Peterson, president and CEO of P2S Engineering, Inc., in

Long Beach, Calif. "People on the infrastructure side are seeing much better backlog growth and profitability than people in the vertical market."

Downward trends in the economy could actually spell opportunity for CAMEE Member Firms in 2016, Peterson says. Higher energy costs, for instance, would benefit business. "Our M&E designs are around how we can lower energy costs for clients. When we have a significant energy increase, then clients look to our engineering expertise for efficiency or new designs. This sets us apart from our less technical competition," he says.

Peterson believes that more funding sources for infrastructure would have the biggest impact on the engineering industry in the coming year.

"The can has been kicked down the road for too long on infrastructure across the United States, especially with improvements to transmission distribution systems and electrical," Peterson says. "The investments we should be making on an annual basis to keep those things as reliable as they can be haven't been made for years and years. How do we come up with that extra money? Our politicians don't seem to have an answer."

Small Firm Council (SFC)
Chairman: Matthew Murello
Member Firms: 172
Mission: *Increase business prospects for small and mid-size firms through custom-designed forums, advocacy, tools and processes.*

Matthew Murello

SFC Member Firms have their hopes raised for long-term federal transportation legislation, which has the best chance of passing in years—and would benefit small businesses.

"When the Highway Trust Fund filters down to state funding projects—as well as municipal funding projects for schools, infrastructure, roads and highways—that's where small engineering firms are capitalizing," says SFC Chair Matthew Murello, president of Lewis S. Goodfriend & Associates in Whippany, N.J.

Optimism over transportation funding doesn't eclipse persistent challenges that small engineering firms face from the Affordable Care Act, however. "They keep moving the goal post," Murello says about regulations for small businesses and what types of policies are allowed. "Small businesses don't have large HR departments or teams of lawyers looking at these things and trying to forecast these things out. Most small businesses are lucky if they're forecasting six to eight months, and that's good. The days of forecasting out a year or two on projects are gone."

Murello says the best thing that could happen to the engineering industry to ensure future growth is "a drastic change in Washington" and a pro-growth, pro-business mentality. "We need people in Washington who have run a small business, people who have had to make payroll or figure out how they're going to deal with their 941 quarterlies and their end-of-year taxes."

Design Professionals Coalition (DPC)
Chairman: William Siegel
Member Firms: 53
Mission: *Promote action that advances the interests of ACEC's larger firms in public policy, funding and contracting with federal and state agencies.*

William Siegel

Global competition and the volatile global economy are two of the biggest challenges confronting large U.S. engineering firms. A significant number of DPC firms have extensive overseas operations or work on projects in partnership with overseas owners, says DPC Chair William Siegel, president and CEO at Kleinfelder in San Diego.

"We're still thinking that even if developing countries slow down, they're still going to be growing at 5 percent to 7 percent, which is higher than the United States," Siegel says.

Design Professionals Coalition
Founded in 1983

Some areas of the world are up, such as booming regions of Africa, while others such as China are down.

Siegel predicts that the U.S. will remain in slow- to no-growth mode for another five years. But other areas look promising in 2016. "Europe has some bright spots but overall is struggling with debt and other issues," he says. "There is a lot of growth from a population/demographics perspective in Africa and some South Pacific countries like Indonesia and Malaysia, and generally that drives infrastructure and demand for engineering services. But there are no guarantees."

All six coalition leaders agree that ACEC plays a significant role in addressing the industry's business challenges. "The more we try to get the message out through government advocacy and from a lobby standpoint, the better and stronger we are as a group," Siegel says. ■

Stacy Collett is a business and technology writer based in Chicago.

ACEC 2015 Fall Conference Is…

BOSTON STRONG

Nearly 1,000 members and guests participated in a business program featuring world-renowned speakers and a strong focus on industry innovation.

ACEC President Dave Raymond welcomes attendees to the 2015 Fall Conference at the Westin Copley Place in Boston.

ACEC Chairman Ralph Christie to the Board of Directors: "The incredible cooperation that we enjoy between national and state programs to achieve our advocacy and business interests is what makes our association so strong."

World-famous oceanic explorer Dr. Robert Ballard and Pulitzer Prize-winning author Doris Kearns Goodwin highlighted the 2015 Boston conference. Member Firm CEOs reviewed industry conditions and best practices. CIOs, CFOs, emerging leaders and other industry professionals participated in more than 30 advanced business management sessions. >>

"It was a very well-organized conference, and the lineup of programs was salient to our business needs," said Dean Anagnost, KLJ, Bismark, N.D. "I received value from everything I attended."

"With a coast-to-coast organization such as ACEC, this was an important occasion for information sharing and discussion of those legislative, regulatory and industry issues that we all must address," said Jason Matson, Kimley-Horn and Associates, Orange, Calif.

Pulitzer Prize-winning author Doris Kearns Goodwin provided interesting insight on leadership from her study of U.S. presidents.

Ocean Explorer Ballard Has Sights on New Deep-Sea Breakthrough

Dr. Robert Ballard, whose trailblazing discoveries of the *Titanic*, the German battleship *Bismarck* and John F. Kennedy's *PT-109* already appear on his resume, said he wasn't done yet.

"I have one more trick in me—colonization of the world's oceans," he said. "We have no choice but to move out into the ocean. We need to farm and herd and increase the productivity of the ocean for the future survival of mankind. I'm working hard on a design right now."

Ballard, who was presented the ACEC Distinguished Award of Merit—the Council's highest award given to an individual—recapped his legendary career and then stunned many listeners by revealing that his 1985 discovery of the *Titanic* was actually the cover for a classified U.S. Navy intelligence operation to find two U.S. nuclear submarines, the *Thresher* and the *Scorpion*, lost during the Cold War in the 1960s. After finding the missing submarines, Ballard had 12 days left to find the sunken luxury liner—and succeeded.

"The guise of searching for the *Titanic*'s wreckage provided a perfect alibi for the intensified presence of U.S. ships on the Atlantic," he said.

Kearns Goodwin: Noteworthy Presidents Share Similar Leadership Traits

Doris Kearns Goodwin, the best-selling author of acclaimed biographies of U.S. presidents, said she discovered a common leadership trait among her subjects, regardless of the era in which they lived or the challenges they faced—the ability to effectively communicate.

In her biographies of Lyndon Johnson, John F. Kennedy and Franklin Roosevelt (for which she won a Pulitzer Prize), along with Theodore Roosevelt and Abraham Lincoln, Goodwin learned that an exceptional ability to communicate shaped each president's legacy.

"FDR was perfectly suited to the new age of radio," she said. "When his fireside chats aired, more than 80 percent of the nation's radios were tuned in.

"Teddy Roosevelt masterfully used newspapers to his advantage and his whistle-stop tours were an excellent way to meet with local editors, in addition to the citizens. JFK and Reagan were outstanding in the way they took advantage of a new age of television."

She also emphasized that President Lyndon Johnson is earning newfound respect, thanks to the current cantankerous political climate. "People are beginning to realize and appreciate the way Johnson used his ability to communicate to get Congress to do major things at a critical time for our nation," Goodwin said.

Dean Zerbe, former counsel to the Senate Finance Committee, predicted passage of a highway bill before year-end.

Renowned oceanic explorer Dr. Robert Ballard, recipient of the ACEC Distinguished Award of Merit, shared highlights of his legendary career.

Stephen Hickox (at the podium), chairman and CEO of CDM Smith, was part of a CEO panel that discussed the importance of innovation in the A/E industry. The other panelists were Eric Keen (center), vice chairman and engineering president of HDR, and Tom Scarangello (right), chairman and CEO of Thornton Tomasetti.

Former Senate Finance Counsel Praises ACEC, Predicts New Highway Bill in December

Dean Zerbe, former counsel to the Senate Finance Committee, forecast that Congress would pass a highway bill for President Obama's signature by the end of the year.

"I believe the bill will contain about two-and-a-half years of funding as part of an overall six-year package," Zerbe said to conference attendees. "I expect it all to be finalized sometime in December."

Currently serving as national managing director for alliantgroup, Zerbe praised ACEC for its aggressive advocacy on several tax measures, including R&D tax credits, cash method of accounting and capital gains.

"ACEC's efforts on the cash accounting issue is a good example of what an organization can do to keep the issue on the minds of policymakers," he said. "Nothing matters as much as when engineers meet with their representatives in your state or district. Being on the Hill for 18 years, I can tell you both sides really want and need to hear what you have to say."

CEOs Describe Industry's 'Need to Drive Innovation'

Thornton Tomasetti Chairman and CEO Tom Scarangello described his firm's commitment to "bet the farm

Robin Greenleaf, president of Architectural Engineers, Inc., in Boston, was presented the 2015 ACEC Chairmen Emeritus Award by former ACEC Chairman Dick Wells for her exemplary contributions to the Council. Moments earlier, Greenleaf also received the 2015 ACEC Coalitions Distinguished Service Award.

Lisa Brothers (left), president and CEO of Nitsch Engineering, made a point during a panel discussion of people and practices that build firm success. Other panelists were Mike Carragher (center), president of VHB, and Larry Smith (right), president and CEO of Haley & Aldrich.

on innovation" and how the company works internally and with clients to build a learning organization.

"If our industry is to thrive," he said, "we need to drive innovation, not just adapt to it."

HDR Engineering President Eric Keen talked about how smart infrastructure and Big Data are changing the industry. "Technology is changing our approach to design," he said. "We are becoming information engineers. Design files are no longer construction documents, but intelligent information files that continue for the life of the facility."

One of the biggest challenges for firms, said CDM Smith Chairman and CEO Stephen Hickox, is responding to the big market drivers, such as regulatory changes, major population shifts and climate change/resiliency. "You can't be afraid of change," he said. "Never be satisfied with the status quo."

CEOs Discuss How Strong Teams Build Successful Firms

"In order to have sustainable firm success," VHB President Mike Carragher told a general session audience, "you need to maintain a balance between business concerns and your people."

Carragher outlined programs such as employee ownership and accredited in-house learning that have helped propel VHB's growth. "We focus on our people," he said, "and let them follow their passions."

"Culture drives everything," said Nitsch Engineering President and CEO Lisa Brothers, whose company was named the second-best civil engineering firm to work for in the United States by ZweigWhite. Brothers pointed out that firms on that list historically have had a 16.39 percent average annualized return compared with the S&P 500's average annualized return of 4.12 percent. "Having engaged employees is a competitive advantage," she said.

At Haley & Aldrich, President and CEO Larry Smith has a leadership development program based on ACEC's highly successful Senior Executives Institute. "We've had 104 staff go through the five, four-day sessions," he said. "It has knit the company together more than anything else we could have done."

ACEC Celebrates Young Pros; Scholars; and Community Service, Coalition, and Chairmen Emeritus Award Winners

ACEC presented Young Professional of the Year awards to five Member Firm employees who have made significant contributions to the industry early in their careers: William Billiet, Schnabel Engineering, Baltimore; Dennis Hymel Jr., T. Baker Smith, Thibodaux, La.; Juan Osorio, Langan Engineering & Environmental Services, Elmwood Park, N.J.; Corin Marron, ARCADIS, Tucson, Ariz.; and Jessica Garcia, Clanton

Thomas Ritter (left), of Century Engineering in Hunt Valley, Md., and Lamar Dunn (right), of Strategic Services Company in Maryville, Tenn., displayed the rings they received as new members of the Order of the Engineer. Twenty-five members took the Order oath to "uphold the standards and dignity of the engineering profession."

& Associates, Boulder, Colo., who was also chosen by *National Engineers Week* to represent ACEC in its annual "New Faces of Engineering" promotion.

The College of Fellows honored the 2015 ACEC Scholarship Winners: Mariah Schroeder, $10,000 ACEC Scholar of the Year Scholarship; Alex Pint, $7,500 Kennedy/Jenks Consultants Scholarship; Corey Walker, $5,000 ACEC Life/Health Trust Scholarship; Daniel Weisenberger, $2,500 Small Firm Council Scholarship; and Shawna Peterson, $2,500 Council of American Structural Engineers (CASE) Scholarship.

Two members received the 2015 Community Service Award, which recognizes those who make an extraordinary impact on the quality of life in their communities: Clint Robinson, Black & Veatch, Overland Park, Kan., and Eddie Kho, Morton & Pitalo, Folsom, Calif.

ACEC/PAC Continues to Break Records in 2015: More Than $780,000 Raised

ACEC/PAC hosted a Casino Night, with participants enjoying blackjack, roulette and Texas hold 'em. Chips were cashed in for prizes. Attendees also won door prizes.

ACEC/PAC sold more than 800 tickets for its annual ACEC/PAC Fall Sweepstakes. Troy Holloway, Century Engineering, New Cumberland, Pa., won the $10,000 grand prize. Winners of the $5,000 prizes were Matt Crafton, Crafton Tull, Rogers, Ark., and Stephanie Wagner, Wagner Engineering & Survey, Northridge, Calif. Thomas Crochet, McGee Partners, Atlanta, and David Scott, ACEC/Iowa, Des Moines, Iowa, won the $2,500 prizes.

Winners of the $1,000 prizes were Greg Burns, Kimley-Horn and Associates, Frisco, Texas; Mike Burns, Crafton Tull, Rogers, Ark.; John Carrato, Alfred Benesch & Co., Chicago; Charles Gozdziewski, Hardesty & Hanover, New York City; Mary Hall, GZA, Boston; Brenda Longman-Escamilla, Byce & Associates, Inc., Kalamazoo, Mich.; Jeff McElwain, Ackerman-Estvold, Minot, N.D.; Richard McFadden, Jaros, Baum & Bolles, New York City; Gary Powell, Stantec, Chicago; and Jim Thomson, HNTB, Bellevue, Wash. ■

June Jewell, AEC Business Solutions, led a seminar on improving a firm's financial performance.


Paul Wagner, senior vice president of Wagner Engineering & Survey, Inc., in Northridge, Calif., won a $275 gift certificate to Legal Sea Foods as part of the ACEC/PAC Casino Night raffle.

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Guest Column

BY HAL KASSOFF

Envisioning Sustainability In the Infrastructure Business

The leading firms in our business continuously strive to strike the right balance among compelling (and occasionally conflicting) goals—to do what is right for our planet, to reflect the underlying values of our profession, to adhere to the culture of the company, to respond to the needs and desires of our clients, and to achieve the profitability essential to our continued viability. We constantly scan the horizon to discern and to help define the leading edges of our practice, and to determine whether to actively engage in emerging concepts and ideas or continue to assess them against the prisms of plausibility and practicality.

Hal Kassoff

WSP | Parsons Brinckerhoff's strong allegiance to the principles of sustainability is rooted in beliefs and practices that span well over a decade. However, the decision on whether and when to participate as a charter member in the Institute for Sustainable Infrastructure (ISI) Envision® rating system required more deliberation than may have been indicated by our firm's obvious philosophical support for sustainable infrastructure. In fact, we were not among the earliest to enroll as charter members. What caused us to hold back just a bit?

Over the past five years and more, a multiplicity of sustainability rating systems for transportation infrastructure (mostly, though not exclusively, focused on highways) have appeared. We made the decision to be, as the CEO of our U.S. company, Greg Kelly, put it, "agnostic" rather than tilt toward any of the proposed systems.

While others signed on to their preferred systems (Greenroads, GreenLITES, INVEST, STARS or Envision®, among others that were rapidly emerging), we formed a team to study them all, to work with clients on the system that would be the most appropriate to their interests and needs, to learn from and share our experiences, and to see over time which approaches would prove the most sustainable in their own right. Our team developed and circulated information within the firm and to clients and found that the narrower the rating system's focus, the less appealing it seemed to be to the broad range of clients that we serve. At least one client asked us to develop a system from scratch tailored to its specific needs.

So what brought us from neutrality to joining ISI as a charter member in support of Envision®? It was the result of a number of threads. First and foremost was the appeal of a universal system whose breadth extended across the complete array of infrastructure categories—from levees and dams to roads and rails, from airports and seaports to pipelines and power lines, from clean energy and telecommunications to water supply and wastewater treatment. The idea that each of these individual infrastructures would be associated with its own sustainability evaluation system simply did not seem viable over time.

The second consideration was the broad base of support from the three sponsoring organizations—ACEC, the American Society of Civil Engineers and the American Public Works Association—whose reach among professionals and organizations across the industry is so pervasive.

A third factor was the early movement of Envision® to an open body of knowledge available to all interested organizations and professionals, regardless of whether they had the desire or the budget to engage ISI in the full-fledged, fee-based, third-party review system.

Fourth was our early rapport and ultimate trust in the competence, commitment and collaborative approach of the ISI professional staff—particularly its leader Bill Bertera, who came out of retirement and has so skillfully navigated among the occasionally disparate goals and expectations of the founding organizations and early adopters.

Fifth was the early movement among progressive clients to train their staff to gain the ENV SP credential. A few reflected in their procurement documents their desire for—indeed, in some cases their demand for—ENV SPs on the professional staffs of firms competing for their business.

As these factors aligned toward the end of 2013, the company moved quickly to join the community of charter members. As professionals, and as leaders in our industry, it was the right thing to do. And from a business perspective, it was the smart thing to do.

When these reasons for signing on became evident, our leadership moved with dispatch from "wait and see" to "sign us up" to "how can we help?" ISI told us they needed to build the corps of ENV SPs to a critical mass, to serve as advocates as well as analysts in advancing sustainable infrastructure. We also agreed that we

The New York City 26th Ward Wastewater Treatment Plant earned Envision Silver.

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▲ The South Los Angeles Wetland Park earned Envision Platinum.

◀ The Snow Creek Stream Environment Zone Restoration earned Envision Platinum.

▼ The Grand Bend Area Wastewater Treatment Facility earned Envision Platinum.

COURTESY OF STANTEC

needed more of our professionals to learn about the value of the Envision® system to inform and to inspire owners in the application of sustainability principles and practices as well as to conceive sustainable solutions and evaluate outcomes. In our discussions with ISI, we accepted the challenge to have at least 100 of our staff earn the ENV SP credential within one year (by the end of 2014).

Our leadership took this challenge seriously. By the end of the year, we surpassed the goal of 100, and well into our second year, the numbers continue to grow. And while interest in the full-fledged, third-party, fee-based formal evaluation process is still emerging, numerous projects and clients have been influenced by the broad-based criteria inherent in Envision® that is freely available online.

WSP | Parsons Brinckerhoff continues to support clients in their use of alternative sustainability rating tools. And ISI's noncompetitive approach, predicated on the belief that "a rising tide lifts all ships," has been refreshing and progressive.

We fully expect that our engagement with ISI and Envision® will demonstrate that what's good for the planet, what reflects the values of our professionals, what resonates with the culture of our organization, and what both serves and stretches the aspirations and expectations of our clients are also important to the viability of our enterprise from a business perspective.

Hal Kassoff is senior advisor and principal professional associate at WSP | Parsons Brinckerhoff.

BY TIM ATHEY

Engineer as Executive

Having spent the bulk of my professional career working with science, technology and A/E/C firms, I've discovered that all of these organizations rely on engineering expertise to fuel the innovation, product/service design and market growth for their respective firms.

Another common thread for these firms is the challenge they face in identifying and developing senior leadership talent required to carry the organization into the future.

The question of whether or not engineers make good executives is moot. Some of the best CEOs I've worked with are engineers. Some of the worst were engineers as well. What makes the difference?

Steps to Executive Leadership

People who choose science, technology and engineering as a profession bring distinctive strengths to their craft. Some of these strengths, such as intelligence and analytical ability, are inherent to the individual. Other strengths, such as problem solving and project management skills, are learned.

The key challenges for emerging executive leaders in science, technology and engineering companies include the following personal transformations:

- FROM analyst and problem solver TO strategist and decision maker.
- FROM being the smartest person in the room TO being the best communicator in the room.
- FROM avoiding mistakes and minimizing risk TO learning from mistakes and taking bold action.
- FROM creating the best technical solution TO creating the environment for innovative ideas.
- FROM taking pride in their own achievements TO taking pride in achieving results through others.

Based on a benchmark of competency models for technical/engineering leadership, as well as my own experience, the following are six key roles that executives must play in today's world:

Strategic Catalyst

Emerging executives must go beyond simply thinking strategically to quickly translating strategic insights into action faster than the competition. The best engineering executives are:

- ***Lateral Thinkers***—seeing linkages between unrelated ideas and business opportunities.
- ***Rapid Responders***—making good decisions quickly without all the data or analysis.
- ***Intelligent Listeners***—listening, understanding and valuing the ideas of others.

Business Architect

Emerging executives also must learn to be:

- ***Value Integrators***—assembling the organization's people/resources to create new value.
- ***Boundary Busters***—removing legacy barriers to collaboration that prevent value creation.
- ***Talent Builders***—getting the right people with the right skills in the right positions.

People Mobilizer

Urge emerging executives to become:

- ***Personal Engagers***—staying close to the people and sensing the mood of the team.
- ***Priority Lenses***—keeping focused on both short-term priorities and long-term vision.
- ***Energy Infusers***—bringing insight, optimism and hope to their interactions with others.

Force Multiplier

Challenge emerging leaders to become:

- ***Perpetual Simplifiers***—driving process complexity and gridlock out of the business.
- ***Work Innovators***—creating a fearless environment that empowers people to innovate.
- ***Tension Balancers***—creating the right tension between the possible and the achievable.

Culture Builder

Emerging executives must learn to be:

- ***Values Translators***—reinforcing the core values while evolving the culture to compete.
- ***Trust Builders***—effectively winning the hearts/minds of an increasingly diverse workforce.

Tim Athey

- ***Change Leaders***—speaking the truth about what must change and leading from the front.

Enterprise Leader

The five leadership roles described above define the "what" of executive leadership. To achieve these things, emerging executives must possess the following attributes:

- ***Humble Confidence***—a strong sense of self tempered by a keen awareness of blind spots.
- ***Realistic Optimism***—keeping a positive and forward-looking attitude despite difficulties.
- ***Systems View***—seeing the organization as a unified whole and not a collection of parts.

The unique strengths that science, technology and engineering professionals bring to a leadership role far outweigh the potential blind spots. However, the success of these individuals in moving from a traditional management role to a senior leadership position is tied to their ability to let go of many of the things that made them successful technical and engineering managers.

Tim Athey, Ph.D., is an executive coach and consultant based in Fort Collins, Colo., who works extensively with engineering firms on strategy, leadership and organizational efforts. He can be reached at tim@timatheyphd.com.

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ACEC's New Amazon Portal Connects to More Education Resources

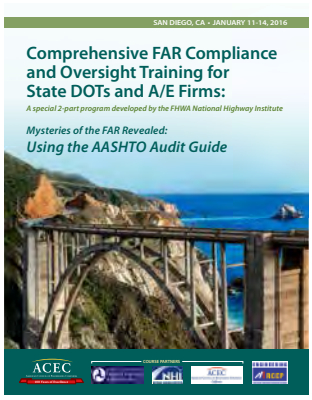
Expanding our mission to provide members with preeminent business education, ACEC's new Amazon Portal now delivers the entire Amazon catalog—books, gifts, resources and more—to site visitors. While not a replacement for ACEC's traditional bookstore, the Portal makes it easier for members to find even more A/E business and related publications—and every sale helps support ACEC's ongoing educational programming. Browse the store at **www.acec.org/publications/amazon/**.

Small Firm Council Winter Meeting

The 2016 Small Firm Council Winter Meeting will feature the seminar *Next Stage Financials: Valuation and Exit Strategy for Small Firms*, presented by Matt Fultz of Matheson Financial Advisors. This 1½-day program, to be held February 12–13, will help attendees understand and apply the key financial metrics that drive value in an engineering firm. Attendees will explore the impact a volatile economy has on financial management beyond revenue, profits, backlog and staff size, while broadening their understanding of engineering firm valuation and its relationship to ownership transition. To register, go to **www.acec.org/calendar/calendar-seminar/2016-small-firm-council-winter-seminar/**.

Mysteries of the FAR Revealed: Using the AASHTO Audit Guide

This two-day program details how to apply the *AASHTO Audit Guide* in the development and administration of A/E consultant direct and indirect costs and rates. Presented by Dan Purvine, president of A/E Clarity Consulting & Training, and Diana DeWitt, CPA, CCIFP, at Mendelsohn & Associates, P.A., the program is composed of two mini-courses: *Developing Indirect Cost Rates* and *Auditing and Oversight of A/E Consultant Indirect Cost Rates*.



This program will be of particular value to Departments of Transportation personnel, along with A/E firm leaders who administer/manage contracts, develop/review RFPs and contracts for government procurement, build/review cost proposals, perform indirect cost rate audits, and provide oversight of contracts and costs. Mark your calendar for January 11–14, 2016, in San Diego.

Review the full agenda and registration information:

COURSE 1: **www.acec.org/calendar/calendar-seminar/mysteries-of-the-far-revealed-using-the-aashto-audit-guide-course-one-san-diego-2016/**

COURSE 2: **www.acec.org/calendar/calendar-seminar/mysteries-of-the-far-revealed-using-the-aashto-audit-guide-course-two-san-diego-ca-2016/**

Business of Design Consulting

Navigating the intricacies of staff dynamics, managing client relationships and expectations, and linking financial performance to overall organizational value are not intuitive skills for most A/E firm managers. They must be learned.

ACEC's *Business of Design Consulting* (BDC) promotes effective leadership and firm management with a strong multidisciplinary perspective. Taught by an experienced faculty of industry practitioners, this 3½-day course highlights current strategies and best practices on several critical areas to help firms thrive despite a churning business environment. Topics include how to manage change and build success in performance management; strategic planning and growth; finance; leadership; ownership transition; contracts and risk management; and marketing. A/E professionals new to firm management will find BDC particularly valuable.

Business of Design Consulting is offered March 23–26, 2016, in Denver, Colo. The program agenda and registration information can be found at **www.acec.org/calendar/calendar-seminar/business-of-design-consulting-denver-2016/**.

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Statement of Ownership, Management, and Circulation

Engineering Inc. (USPS 0007395) is published (bi-monthly) six times a year by the American Council of Engineering Companies.

The mailing address of the publication is 1015 15th Street, NW, 8th Floor, Washington, D.C. 20005. The mailing address of the publisher is 1129 20th Street, NW, Suite 700, Washington, D.C. 20036. The publisher is Manifest LLC, the editor is Andrea Keeney, and the managing editor is Christopher Brandon. The owner of the publication is the American Council of Engineering Companies.

There were 30,662 copies of *Engineering Inc.* published for September/October 2015 issue; the average for the preceding 12 months was 29,582. The paid/requested outside county mail subscriptions for the September/October 2015 issue were 29,389; the average for the preceding 12 months was 28,776. The other classes mailed through USPS for the September/October 2015 issue were 486; the average for the preceding 12 months was 223. Total distribution for the September/October 2015 issue was 30,201; the average for the preceding 12 months was 29,247. Copies of *Engineering Inc.* that were not distributed during the September/October 2015 issue (office use, leftovers) was 461 and the average number of copies not distributed during the preceding 12 months (office use, leftovers) was 335. The percent paid/requested circulation for the September/October 2015 issue was 97%. The average percent paid/requested circulation for the preceding 12 months was 98%.

Members in the News

On The Move

Jacksonville, Fla.-based **RS&H** named **David T. Sweeney** CEO. He joined the firm in 1998 and has served as executive vice president and COO since 2014.

Urban Engineers of New York, D.P.C., finalized an ownership transition of the company to an internal management group. Current President **Edward M. D'Alba** and Executive Vice President **Joseph P. McAtee** sold their ownership to **William Thomsen**, **Kenneth Fulmer**, **Bernard Carolan**, **Mark Kinnee**, **Matthew Marquardt** and **Gerald O'Neill**. Thomsen will serve as president.

The RBA Group promoted **David Lapping** to president. He formerly served as senior vice president and director of New York, Connecticut and Philadelphia operations.

Following **WSP | Parsons Brinckerhoff**'s acquisition of Chicago-based **Halvorson and Partners**, Founding Principal **Robert Halvorson** was named executive vice president. He will continue to lead the Chicago office and work with WSP | Parsons Brinckerhoff's leadership.

W. Troy Rudd was appointed executive vice president and CFO of Los Angeles-based **AECOM**. He formerly served as senior vice president, treasurer and COO of design consulting services Americas and CFO of global design consulting. Rudd assumes the CFO role held by **Stephen M. Kadenacy**, who remains AECOM president. **Keenan Driscoll**, corporate vice president and assistant treasurer, will succeed Rudd as treasurer.

West Palm Beach, Fla.-based **Wantman Group Inc.** named **Mario Echagarrua** COO. He previously served as vice president and office manager of URS Corporation's Boca Raton office.


David T. Sweeney


William Thomsen


David Lapping


Robert Halvorson


W. Troy Rudd


Mario Echagarrua

Members in the News

On The Move

Pasadena, Calif.-based **Jacobs Engineering Group, Inc.**, reorganized its leadership structure and promoted the following to president of four global lines of business: **J. Gary Mandel** will head petroleum & chemicals; **Phillip J. Stassi** will lead buildings & infrastructure; **Terence D. Hagen** will head aerospace & technology; and **Andrew F. Kremer** will lead the industrial global business line. As part of the industrial business line, **Robert G. Norfleet** will become senior vice president and general manager of a life sciences global business unit.

Raleigh, N.C.-based **McKim & Creed, Inc.**, named **Christopher Nelson** CFO. He previously served as partner/divisional CFO of Environmental Resources Management, a London-based environmental sustainability consulting firm.

William K. Harnagel has joined San Francisco-based **T.Y. Lin International Group (TYLI)** as chief financial officer. He recently served as vice president and corporate controller for AECOM.

Muscatine, Iowa-based **Stanley Consultants** appointed **Ken Cable** as chief strategy officer and vice president. He previously served in a number of senior-level positions at CH2M and is based in the firm's Denver office.

Kansas City, Mo.-based **HNTB Corporation** appointed **Art Hadnett** as senior vice president and president of the firm's West Division, where he will oversee infrastructure programs, including rail/transit, tolling and aviation. He previously served as vice president and practice leader of Stantec's transportation division. He is based in Los Angeles.

New York City-based **STV** appointed **John Kuprenas** as senior vice president and deputy director of the firm's construction management division. He is based in the firm's headquarters. **Gus Maimis** was also promoted to senior vice president. Maimis, who joined the firm in 2008, will also serve as Northeast territory manager for the firm's construction management division, overseeing its New York tri-state project teams.

Glen Allen, Va.-based **Schnabel Engineering, Inc.**, promoted **Charles Smith** to senior vice president/senior associate. He is based in Blacksburg, Va.

Pasadena, Calif.-based **Parsons** announced the following appointments: **Rick Henderson** was appointed senior vice president and Middle East Africa (MEA) finance director. He's based in Parsons' MEA regional headquarters in Abu Dhabi, United Arab Emirates. **Kenneth J. Murray** joined the firm as senior vice president of its environment and infrastructure business unit. He is based in Calgary, Alberta. **Ashay Dalvi** was promoted to vice president and corporate controller and is based at the firm's corporate headquarters. **Stephen W. Roth** joined the firm as vice president of business development for its environment and infrastructure business unit. Roth is based in Calgary, Alberta.

New York City-based **Thornton Tomasetti** appointed **John Viise** as a vice president in the firm's structural engineering practice. He is based in the firm's Chicago office.


Christopher Nelson


William K. Harnagel


Ken Cable


Art Hadnett


John Kuprenas


Gus Maimis


Charles Smith


Rick Henderson


Kenneth J. Murray


Ashay Dalvi


John Viise

Welcome New Member Firms

ACEC/Alabama
Mims Engineering, Huntsville

ACEC/Arizona
EPG, LLC, Phoenix

ACEC/Arkansas
Clear Creek Engineers, Little Rock
GarNat Engineering, LLC, Benton

ACEC/California
American Rail Engineers Corporation, San Juan Capistrano
Coachella Valley Engineers, Palm Desert
Frank M. Booth, Inc., Marysville
JD2, Inc., Auburn
John Labib & Associates, El Segundo

ACEC/Florida
jehle-halstead, inc., Milton

ACEC/Kentucky
Russell Environmental Consulting, LLC, Georgetown

ACEC/Maryland
Alban Engineering, Phoenix
Elmech Industrial Services, LLC, Finksburg
J.K. Datta Consultants, Inc., Baltimore
Rossi Transportation Group, Cockeysville

ACEC/Massachusetts
CX Consulting, Inc., Salisbury

ACEC/Michigan
Tourney Consulting Group, LLC, Kalamazoo

ACEC/Mississippi
Dennis Stieffel & Associates, Inc., Biloxi

ACEC/Nebraska
Davis Design, Lincoln

ACEC/Nevada
Angle Engineering, Las Vegas

ACEC/New York
KLG Engineering, PLLC, Jamesville

ACEC/North Carolina
Hydrostructures, P.A., Pittsboro

ACEC/South Carolina
MEI, LLC, Beaufort

ACEC/Texas
Baird & Gilroy, LLC, Richmond
D&S Engineering Labs, LLC, Denton
Fergusson Engineering Services, Rockwall
H & H Resources, Inc., Houston
Kirkman Engineering, Grapevine
LandDev Consulting, LLC, Austin

ACEC/Wisconsin
Toki & Associates, Inc., Milwaukee

100-Year-Old Member Firms

In the July/August issue of *Engineering Inc.*, the cover feature, "Secrets of the Centenarians," highlighted ACEC Member Firms that have been in business for at least 100 years. Since the story was published, members continue to contact ACEC to inform us that their firm is at least 100 years old. The most recent are:

ARCADIS
Highlands Ranch, Colo.
Founded: 1895

MUESER RUTLEDGE CONSULTING ENGINEERS
New York, N.Y.
Founded: 1910

New Member Spotlight: Tourney Consulting Group

Tourney Consulting Group (TCG), headquartered in Kalamazoo, Mich., specializes in quantifying concrete durability and developing cost-effective, service-life solutions for concrete structures. It evaluates parking, bridge, marine and other structures.

Established in 2000, TCG maintains an in-house, state-of-the-art materials laboratory for concrete mix testing and detailed forensic analysis.

The firm is currently providing concrete evaluation services for the new Tappan Zee Bridge and the Goethals Bridge in New York state; the Al Shindagha Tunnel in Dubai, United Arab Emirates; and the Sakonnet River Bridge in Rhode Island.

For more information, visit TCG's website at **www.tourneyconsulting.com**.

Calendar of Events

DECEMBER

1 Clean Power Plan Implementation: How Electricity Generation, Transmission, and Distribution Will Change (webinar)

2 Industry Economic Overview: 2015 Year in Review and a Look Ahead (webinar)

3 Outlook 2013: Time-Saving Shortcuts and Productivity Boosters for Busy People (webinar)

8 Mitigate Risk with Effective Contract Language (webinar)

9 Sell Without Selling! Bolster Your Firm's Business Development with Content Marketing (webinar)

10 The Seven Secrets of Super Successful Project Managers (webinar)

15 From Project Manager to Project Leader (webinar)

JANUARY

11-12 Mysteries of the FAR Revealed: Using the AASHTO Audit Guide—Course One, San Diego

12 Best Practices for Highly Effective Boards (webinar)

13 Mobile and Field Technologies for Engineers (webinar)

13-14 Mysteries of the FAR Revealed: Using the AASHTO Audit Guide—Course Two, San Diego

14 Three Ways to Increase Your Fees Now (webinar)

20 Condos—Why Do They Continue to Be the Most Litigious Project Type? (webinar)

21 World Bank Procurement Reforms Benefit Engineers (webinar)

To sign up for ACEC webinars, go to www.acec.org/education/webinars

Additional information on ACEC activities is available at www.acec.org.

BY NEIL CHURMAN

Three Things Every First-Time Buyer Should Do

While some industry firms have made mergers and acquisitions (M&A) a regular part of their growth strategy, the majority of firms largely remain on the M&A sidelines. At some point, though, many firms will decide to take the plunge and pursue an acquisition.

We've seen more than 100 firms strike their first deal so far in 2015. It's important to remember that even the firms that are the most experienced and successful at M&A were once first-time buyers. If your firm is considering growing through acquisition, here are three critical things you should do.

- **Start with strategy.** Firms pursue M&A for a multitude of reasons. Some are seeking to capitalize on market growth, some are seeking to shore up capabilities and resources, and some join up to be more competitive in their current markets. Firms need to have a clearly defined strategic rationale for pursuing M&A, with buy-in for that strategy among the firm's leadership team.
- **Stay grounded.** For many first-time buyers, rosy projections and ambitious growth goals can cloud judgment, which can lead to overpaying and subsequent results falling short of expectations. All buyers, especially first-timers, need to establish a supportable financial model for the deal that includes some degree of contingency should things not go as planned. Moreover, buyers need to set their "walk away" point for the deal, which is the maximum price they are willing to pay.
- **Set the table.** Identifying and negotiating the deal is only half the battle. For many buyers, the real work comes during integration. First-time buyers should consider their own operations and systems and how prepared they are to combine them with a potential acquisition. Issues such as project management, human resources and information technology can often be the most challenging components of the initial integration.

The list of things first-time buyers need to consider is long, but if firms ready to embark on their first deal keep these critical items in mind, they'll be better positioned to make their deal a success.

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

Watch the M&A Takeaway video that accompanies this article, presented by Mick Morrissey, at www.morrisseygoodale.com/ACECMergers/NovDec2015.

Recent ACEC Deal-Makers

OCTOBER 2015

ACEC Member **KJWW Engineering Consultants** (Rock Island, Ill.) and **TTG Engineers** (Pasadena, Calif.) have merged to create a 900-employee workforce spread across 25 national and five international locations.

SEPTEMBER 2015

ACEC Member **Weidlinger Associates** (New York City), which specializes in structural engineering, merged with ACEC Member **Thornton Tomasetti** (New York City), a provider of engineering design, investigation and analysis. The combined firm will have 1,200 employees.

ACEC Member **WSP | Parsons Brinckerhoff** (Montreal, Canada) acquired structural engineering firm **Halvorson and Partners** (Chicago).

ACEC Member **Johnson, Mirmiran & Thompson (JMT)** (Sparks, Md.) signed a letter of intent to acquire **Tidewater Environmental Services** (Charleston, S.C.), a natural resources consulting firm.

The acoustics team of **Wright Consulting Associates** (Indianapolis, Ind.) joined ACEC Member **KJWW Engineering Consultants** (Rock Island, Ill.), an engineering consulting firm specializing in the health care, education and industrial building markets.

ACEC Member **SvR Design Company** (Seattle) joined multidisciplinary planning and design firm **MIG** (Berkeley, Calif.). SvR's 32-person staff will become the Seattle office of MIG.

ACEC Member **Independent Mapping Consultants** (Charlotte, N.C.) acquired **Carolina Resource Mapping** (Wilmington, N.C.), which specializes in mapping services for transportation and public sector clients.

AUGUST 2015

Stantec (Edmonton, Canada) signed a letter of intent to acquire **Fay, Spofford & Thorndike** (Burlington, Mass.), an engineering, planning and environmental firm. Both are ACEC members. **Stantec** also acquired **VA Consulting** (Irvine, Calif.), a community development, transportation and water engineering firm.

ACEC Member **WSP Global** (Montreal, Canada) entered into an agreement to acquire 2,000-person **MMM Group** (Thornhill, Canada), which specializes in transportation, infrastructure and the environment.

ACEC Members **Alfred Benesch & Company** (Chicago), a transportation and infrastructure firm, and **Tucker, Young, Jackson, Tull** (Detroit), an environmental and civil engineering firm, have merged.

ACEC Member **Black & Veatch** (Overland Park, Kan.) acquired **RCC Consultants** (Woodbridge, N.J.), a global telecommunications firm.

ACEC Members **David Evans and Associates** (Portland, Ore.) and **Triad** (Woodinville, Wash.), a multidisciplinary design firm, have merged.

Neil Churman is principal consultant of Morrissey Goodale LLC—a strategy, M&A and human capital solutions firm serving the A/E/C industry. Churman, who is based in the firm's Houston office, can be reached at nchurman@morrisseygoodale.com.

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