ECOLOGICAL WASTEWATER TREATMENT

Emory University system provides campus resiliency through onsite reuse

This new guide provides guidance and assistance to professionals engaged in the repair of concrete buildings. The guide has been developed to serve as an invaluable companion to ACI 562-13.

The new guide is separated into two main components: chapter guides that follow the organization of ACI 562, broken down by the corresponding sections and project examples that illustrate the use of the code for real world projects from inception through completion.

These two components work together to provide additional information on how to apply the performance requirements in ACI 562 and how the requirements may be applied to a broad range of projects. Published jointly by ACI and ICRI.


The ACI 562 code provides standard requirements for evaluating existing concrete buildings and the subsequent structural repair, rehabilitation, and strengthening of those buildings. This code provides rules for a preliminary evaluation that determines the “design basis code,” that is, the version of 318 with which the repair design must comply. The code provides rules for determining strength of in-situ material, performing structural analysis, designing for repaired strength and durability, requirements for stability and shoring of construction, and inspection and testing of repairs. Commentary provides application guidance as well as references for additional information.

Both documents are available in hard copy or PDF format.

Must-have documents for structural concrete repairs.

<table>
<thead>
<tr>
<th>Formats</th>
<th>Order Code</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Guide to the Code for Evaluation, Repair, and Rehabilitation of Concrete Buildings</td>
<td>MAN56213.SPEC</td>
<td>$120.50 (ACI members $72.00)</td>
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<tr>
<td>Code Requirements for Evaluation, Repair, and Rehabilitation of Concrete Buildings (ACI 562-13) and Commentary</td>
<td>56213.SPEC</td>
<td>$130.50 (ACI members $78.00)</td>
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<tr>
<td>Guide and Code Requirements for Evaluation, Repair, and Rehabilitation of Concrete Buildings</td>
<td>REP562PACK.SPEC</td>
<td>$187.50 (ACI members $112.00)</td>
</tr>
</tbody>
</table>
Contents January 2016

Event Preview
14 Environmental Connection 2016

On the Rise
21 Awards, Promotions, and New Hires

Profile
22 WSP | Parsons Brinckerhoff: Contributing Diversified Capabilities

Firms in Focus
27 Creating the Perfect RFP
30 Information Management Policies

Project + Technology Portfolio
32 Buildings Designed for Salt Storage

36 The WaterHub at Emory University
42 Precast Concrete Wind Turbine Towers
43 Goldman Sachs Expands Focus on Clean Energy
44 Successfully Vegetating a Jobsite
46 How to Model Roofs
50 Award-Winning Bridges
53 Transit’s Impact on Congestion
54 First-In-Nation Technology Taps Renewable Water Supply

Sustainable Design
57 Green Construction is Major U.S. Economic Driver
58 Building Resilient States
59 First Code Improvements Adopted Based on NIST Joplin Tornado Study

ON THE COVER
The WaterHub at Emory University mines wastewater from the campus sewer system and repurposes it for reuse using an engineered blend of technology and nature — story on page 36.
Photo: courtesy of Sustainable Water
DEPARTMENTS

12 CIVIL + STRUCTURAL ENGINEER ONLINE
13 EVENTS
60 PRODUCT + SOFTWARE GUIDE
65 READER INDEX
66 CIVIL + STRUCTURAL DESIGN TOOLS

COLUMNS

06 FROM THE PUBLISHER: ANOTHER JAM-PACKED ISSUE
By Mark Zweig

08 ENGINEERING OUR FUTURE: NEW YEAR, NEW GOALS
By Chad Clinehens, P.E.

10 ENGINEERING FRONT LINE: NEW LA SEISMIC ORDINANCE TO SAVE LIVES AND A CITY
By H. Kit Miyamoto, Ph.D., S.E.
1. StormTech combines over a decade of experience and innovation with the best technical support in the industry which includes in house plan and field services.

2. StormTech offers the widest range of chamber sizes for design flexibility. All our StormTech chambers meet ASTM, CSA and European standards for quality and structural integrity. Over 11,000 installations worldwide in 14 years provide an exceptional track record of performance and reliability.

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4. MC series chambers utilize corrugated end caps necessary to match the strength of these large chambers in demanding applications.

5. StormTech’s gold color minimizes the warm temperature effects on the structure. Dark colored chambers can experience up to 50% increase in temperature in the sun and a corresponding decrease in strength.
IT’S ALREADY 2016 — wow, December flew by — and our editor, Bob Drake, and his crew have assembled a jam-packed issue of Civil + Structural Engineer magazine for us all to read by the fire during this cold, cold January! There’s so much in here — where do we start?

Our profile on WSP | Parsons Brinckerhoff is a great example of the big getting even bigger. WSP | Parsons Brinckerhoff does everything from transit and transportation to urban planning, to structural and MEP design for tall buildings to IT systems integration for both transportation and buildings projects. They are a real powerhouse in this business.

Marketing veteran Bernie Siben outlines what a “perfect” RFP from a public-sector agency would contain. Mika Javanainen, with M-Files Corporation, discusses unauthorized employee file-sharing practices prevalent at civil and structural engineering firms and the challenges this creates, including security risks and version control.

We also have a feature on Environmental Connection 2016, the International Erosion Control Association’s annual conference, which they bill as the world’s largest soil and water event. Scheduled for Feb. 16-19, 2016, in San Antonio, Texas, the event offers continuing education in erosion and sediment control and stormwater quality, as well as “the largest exhibit hall of its kind.”

In another feature, McKim & Creed describes its design of the WaterHub at Emory University, which recycles approximately 400,000 gallons of water per day — about 40 percent of the university’s water needs. It is the first system of its kind to be installed in the United States and was named the 2015 Innovative Project of the Year by the WateReuse Association.

We have coverage of famous bridge design firm, Finley Engineering Group, founded by my old pal Craig Finley, which won two 2015 ASBI Bridge Excellence awards from the American Segmental Bridge Institute (ASBI). Additionally, two projects were finalists in the Bentley 2015 Be Inspired Awards competition.

There’s all of this—and much more in this issue. All we ask is this: Please pass it along to a peer or associate when you’re finished with it. We want everyone who can benefit from the information and inspiration we’ve assembled here to do so. We have more great content coming in February. Meanwhile, stay warm, wherever you are!
INTRODUCING
The Only Code-Listed Precured Laminate

Our Fiber Reinforced Polymer (FRP) solutions are now code-listed. With this code report, Simpson Strong-Tie offers the only code-compliant precured laminate in North America. As part of our Composite Strengthening Systems, our code-listed carbon fabrics also provide some of the highest design values on the market.

Our fabrics include both unidirectional and bidirectional carbon and E-glass, and our precured laminate can be ordered and cut to size. Learn more by calling (800) 999-5099 and visiting strongtie.com/rps.

Code Listed: ICC-ES ESR-3403
NEW YEAR, NEW GOALS

DOES YOUR FIRM or organization have a strategic plan complete with annual goals? If so, request a copy of it. Hopefully you work in an organization that shares information like that with all employees. As you set your own personal career goals for 2016, your success can be greatly enhanced by working toward the stated goals of your firm or organization.

If you do not have access to these corporate goals — or your firm doesn’t have them in the first place — you should still set goals for yourself in the new year. Here are some things to consider as you develop goals for your career:

• Self-assessment — Consider where you are now and where you have been. Are you happy with your current career trajectory? Have you accomplished more or less than what you expected? Defining the future requires a candid look at the past and making adjustments to change course, if needed. Regardless of where you are, setting goals for career growth and self-improvement are only bound by how big you can dream.

• Self-worth — Are you making what you are worth? If not, it may be because you are not producing at a high enough level to justify where you think you should be. It may also be that you are the unfortunate victim of a compensation system in your organization that does not adequately recognize and reward performance. There are a number of sources available to assess this. Don’t ever rely on just one though! Collect as many data points as possible when assessing your monetary value.

• Self-teaching — What skills could you improve that would improve your position and grow your career — public speaking, sales, or strong writing? There are a number of organizations and resources available for those who want to learn something new on their own. Additionally, your company may be willing to invest in training for you. You never know until you ask. The important thing is that you are always learning!

Having goals that are congruent with your company is a great way to enhance your success in your firm. The important thing, though, is to have personal career goals regardless. Engineering your future requires intelligent design and effort. Make 2016 the best year of your career!

CHAD CLINEHENS, P.E., is Zweig Group’s executive vice president. Contact him at cclinehens@zweiggroup.com.
Full scale testing proves our seismic covers will perform in the real world

Since no two projects are alike, virtually every seismic expansion joint cover is unique. C/S has over 40 years experience in every seismic hot bed across the globe. We also have the industry’s only full scale, in-house test facility so you can see your cover perform in real world conditions—before it’s been installed. How’s that for peace-of-mind? For a catalog and free consultation, call Construction Specialties at 1-888-621-3344 or visit www.c-sgroup.com.
As a structural engineer working with governments and communities around the world as they face earthquake disasters, I’ve seen tragedies after a catastrophic earthquake when the city was not ready. From the loss of historic buildings to modern multi-story hotels pancaked onto the soft first story and non-ductile concrete schools that collapsed like decks of cards on innocent children, these are horrible things to witness when you know — as engineers do — that better engineering and construction would have saved lives and a city. I say this to make a point. Los Angeles, which recently enacted one of the most progressive seismic ordinances, did so to avoid a fate similar to the disaster scenes I’ve witnessed in places such as Sichuan, China (2008), Port-au-Prince, Haiti (2010), Christchurch, New Zealand (2011), Tohoku, Japan (2011) and Nepal (2015). These recent earthquakes combined killed well over half a million people and destroyed the livelihoods of countless people.

The new LA City Seismic Ordinance requires owners of about 15,000 non-ductile concrete and soft-story buildings to strengthen their structures — buildings we’ve long known would perform very poorly in an earthquake. Los Angeles citizens understand that the seismic faults that snake under their city are capable of releasing a big one. Other cities that have passed similar laws include San Francisco, Berkeley, and other Bay Area cities. Under the new law in Los Angeles, owners will have seven years to fix soft-story buildings and 25 years to repair non-ductile concrete buildings. But one of the most important aspects of this ordinance is to utilize tax incentives to finance the retrofit. Seismic upgrades must be commercially feasible to be successful. Attempts to only use code and the law to require people to strengthen buildings often end up as failures.

While California cities lead the way to address the most dangerous buildings, cities in high seismic regions, including some eastern U.S. cities, should be equally concerned about their building stock and the people who live and work in them. We are in a very active seismic era, currently. Our cities are overdue for a next big one. As Los Angeles Mayor Eric Garcetti said: “I’m not interested in making history or having the toughest laws. I’m interested in preserving our city’s ability to survive and thrive after an earthquake.”

What people in earthquake-prone cities should know is that engineers have ways to cost-effectively and creatively upgrade their investments. We can help them to prepare for the next major earthquake in commercially feasible ways. It will protect their investment and business and will eventually save many lives.

H. KIT MIYAMOTO, PH.D., S.E. is the CEO and a structural engineer for Miyamoto International (http://miyamotointernational.com), Global Risk Miyamoto, and a nonprofit organization, Miyamoto Global Disaster Relief. He specializes in high-performance earthquake engineering, and disaster mitigation, response, and reconstruction.

People in earthquake-prone cities should know that engineers have ways to cost-effectively and creatively upgrade their investments.
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QuickRWall
Retaining wall design for concrete and masonry. Creates reports like hand calculations: easy to check.

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Project Profitability: Strategic project management plan
By Howard Birnberg, Association for Project Managers

Project management is not a static activity. Developing and improving your project management program requires a plan, regularly updated and directed. This strategic plan guides your decision-making regarding hiring, training, software acquisition, project management tools development, organizational changes, compensation, and dozens of other topics.

As is true with all strategic planning efforts, the strategic project management plan requires a step-by-step approach to develop and maintain successfully. These steps typically include an assessment process, benchmarking of best industry practices, determination of goals and objectives, writing of a plan, implementation, and updating/revising. Unfortunately, in most design and construction organizations, the project management program evolves without any planning.

Read the entire article at http://tinyurl.com/projectprofit-jan16.

Diversions: Greatest hits
By Andy Sciarabba, P.E.

If you’re reading this article, your 2016 New Year’s Resolutions have already been made. And if you’re like me, they have already been broken or substantially altered. “Set the bar low and you’ll never be disappointed,” someone once said. That person never got very far. But you should be proud of one accomplishment: You survived the year-end scoring of seemingly unimportant things — all the “Best-of’s.”

Read the entire article at http://tinyurl.com/diversions-jan16.
JANUARY

BECOMING A BETTER PROJECT MANAGER
JAN. 26, 2016, LAS VEGAS
FEB. 2, 2016, HOUSTON
MARCH 15, 2016, FAYETTEVILLE, ARK.

This course provides a fundamental understanding and some specific tools that new and aspiring project managers can use to be more effective.
https://zweiggroup.com/seminars/better_pm

ADVANCED PROJECT MANAGEMENT
JAN. 27, 2016, LAS VEGAS
FEB. 3, 2016, HOUSTON
MARCH 16, 2016, FAYETTEVILLE, ARK.

One-day seminar to help higher-level design and technical professionals develop advanced leadership and management skills to better lead projects and clients.
https://zweiggroup.com/seminars/advanced_pm

GEODESIGN SUMMIT
JAN. 27-28, 2016, REDLANDS, CALIF.

Learn how geodesign as a tool for collaborative planning and design is being used to create safe, sustainable, and increasingly more resilient communities.
http://geodesignsummit.com

FEBRUARY

BECOMING A BETTER RECRUITER
FEB. 11, 2016, DALLAS
APRIL 7, 2016, WASHINGTON, D.C.

Be more comfortable approaching great talent and learn how to promote the firm, its culture, and career opportunities and advancement.
https://zweiggroup.com/seminars/better_recruiter/index.php

GEOTECHNICAL & STRUCTURAL ENGINEERING CONGRESS
FEB. 14-17, 2016, PHOENIX

The ASCE’s Geo-Institute and Structural Engineering Institute are combining their annual conferences to offer one expanded conference featuring 15 tracks and six plenary sessions focusing on interdisciplinary and discipline-specific areas. In addition, more than 100 exhibitors are expected.
http://geo-structures.org

ENVIRONMENTAL CONNECTION
FEB. 16-19, 2016, SAN ANTONIO, TEXAS

Environmental Connection provides peer-reviewed education, products, and technology that address four educational tracks: Erosion and Sediment Control; Stormwater Management; Surface Water Restoration; and MS4 Management.
www.ieca.org/conference/annual/ec.asp

INTERNATIONAL CONFERENCE ON WATER MANAGEMENT MODELING
FEB. 24-25, 2016, TORONTO

Emphasis on state-of-the-art computer modeling for resolving water quantity and quality problems in stormwater, wastewater, and water distribution systems.
www.chiwater.com/Training/Conferences/conferencetoronto.asp

MARCH

PCI CONVENTION & NATIONAL BRIDGE CONFERENCE
MARCH 1-5, 2016, NASHVILLE, TENN.

PCI Convention and National Bridge Conference is co-locating with The Precast Show, creating the largest tradeshow in North America dedicated to precast concrete. More than 35 education sessions focus on key areas such as technical, transportation, research, marketing, business, and productivity.
www.pci.org/2016convention

SUSTAINABLE WATER MANAGEMENT CONFERENCE
MARCH 7-10, 2016, PROVIDENCE, R.I.

Solutions for balancing the benefits of conservation with the costs; managing water resources, sustainable utilities, and infrastructure; urban planning and design; energy efficiency; water conservation; stormwater; and reuse.
www.awwa.org/conferences-education/conferences/sustainable-water-management.aspx

BUILDING AN ENTREPRENEURIAL FIRM
MARCH 9-10, 2016, MIAMI
APRIL 13-14, 2016, DALLAS

Taught by Mark Zweig, this one-day seminar is specifically designed for entrepreneurially minded leaders in the architecture, engineering, planning, and environmental industries. It was designed to help your firm blow past static, incremental growth and become a benchmark in the industry.
https://zweiggroup.com/seminars/baef

APRIL

GEO-AMERICAS 2016
APRIL 10-13, 2016, MIAMI BEACH, FLA.

The 3rd Pan-American Regional Conference on Geosynthetics — hosted by the North American Geosynthetics Society. The technical program will be comprised of short courses, technical sessions, panel discussions, and keynote lectures addressing a range of topics..
www.geoamericas2016.org

Send information about upcoming conferences, seminars, and exhibitions relevant to civil and structural engineering to Bob Drake at bdrake@zweiggroup.com.
FEBRUARY 16-19, 2016, the International Erosion Control Association (IECA) will be hosting its annual conference, the world’s largest soil and water event. The event is centrally located — in San Antonio, Texas — which always draws crowds. With peer-reviewed education, the largest exhibit hall of its kind featuring more than 130 products and services from around the globe, and unique events designed to build long-lasting professional relationships, Environmental Connection 2016 is the ideal place for industry professionals dealing with erosion and sediment control and stormwater quality.

Seven full-day courses for engineers
Attendees of IECA’s annual conference can expect the latest education from some of the industry’s most respected instructors. As the landscape of the erosion and sediment control industry continues to develop, it is even more important to stay well-versed on the latest techniques. IECA’s peer-reviewed education is sure to have an immediate impact when attendees return to their jobs with the knowledge they receive at courses and technical sessions offered at Environmental Connection.

The conference full-day training, held Tuesday, Feb. 16, at the Hilton Palacio del Rio, features seven courses specifically for engineers. Professional engineers and others interested in pursuing or maintaining a professional certification will benefit from the seven Professional Development Hours (PDHs) and 0.7 IECA Continuing Education Credits (CEUs) given after the completion of each full-day training course.

New this year: IACET Certified Courses — IACET-approved full-day courses are worth 0.7 IACET CEUs, which is equivalent to 7 PDHs.

Phase II MS4 Program Compliance & Effectiveness
Technical Level: All
Course #: EC4-0216-7
Credit: 0.7 IACET CEU (7 PDHs)
Instructors: JB Dixon, CISEC, CPESC, and Carrie Powers, CPESC, CMS4S
This course will guide stormwater practitioners through the fundamentals of managing and maintaining an effective, successful MS4 program for
HaTelit® offers an exhaustive range of asphalt reinforcement grid products finished with a coating with over 60% bitumen content for the active retardation of reflective cracking. HaTelit® can thus deliver the ideal solution to every challenge.

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<thead>
<tr>
<th>Straightforward installation</th>
</tr>
</thead>
<tbody>
<tr>
<td>High installation rate</td>
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<td>Resistant to installation damage</td>
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communities and delegated agencies. While regulatory requirements emphasize program compliance, this course will provide the tools not only to achieve compliance but also to provide performance measures and metrics for evaluating MS4 Program effectiveness.

**RUSLE2 Training for Construction Site Applications**

Technical Level: Intermediate  
Course #: EC1-0216-7B  
Credit: 0.7 IACET CEU (7 PDHs)  
Instructor: David Lightle, CPESC  

Federal and state regulations increasingly are requiring use of erosion prediction models and tools to evaluate offsite erosion and sediment deposition impacts of construction activities. New versions of the RUSLE 2 model contain specific functionality that addresses issues such as the sum of daily erosivity for the construction period to determine if an EPA permit is required. It also utilizes a segmented profile description to compare the effect of adding slope treatment practices in lieu of retaining all or part of existing vegetation buffer strips at the lower extent of construction. Learn how to apply the latest version of RUSLE2 and customized construction site databases for erosion and sediment control design work.

**Bioingeniería de Suelos en Zonas Tropicales**

Technical Level: Intermedio  
Curso #: EC1-0216-7A  
Crédito: 7 PDHs  
Instructor: Luiz Lucena, CPESC  
Este curso presenta los principios y mejores y más nuevas prácticas de La Bioingeniería de Suelos a través del estudio del desarrollo de la tecnología y casos prácticos, con énfasis en las condiciones tropicales y áreas con procesos erosivos severos.

**Cost Effective Stormwater Pollution Prevention Solutions**

Technical Level: All  
Course #: EC3-0216-7  
Credit: 0.7 IACET CEU (7 PDHs)  
Instructor: Gerald Montgomery, CPESC, CPSWQ, ToR  
This course covers managing stormwater pollution prevention on both construction and industrial sites, with a focus on practical techniques to protect water quality in a cost-effective and compliant manner.

**Scour Analysis for Streambank Stabilization**

Technical Level: Intermediate
In this course, participants will learn the limitations of various procedures and have the opportunity to select procedures and estimate scour for a case study.

Bio-Technical Remediation of Urban Channels
Technical Level: All
Course #: EC1-0216-7C
Credit: 0.7 IACET CEU (7 PDHs)
Instructors: Jerry Sanders, CPESC, and Hector Sotelo, P.E.
This course provides tools and understanding of how bio-technical stream channel remediation can be installed in urban channels to provide channel stability and water quality enhancement. Participants will learn how to evaluate channels and implement the appropriate bio-technical procedures.

Innovative Designs for Erosion, Sediment, and Turbidity Control for Construction Projects
Technical Level: Advanced
Course #: EC1-0216-7D
Credit: 0.7 IACET CEU (7 PDHs)
Instructor: Ted Sherrod, P.E., CPESC, CPSWQ, CMS4S
In less than one day, learn a simple, step-wise process for selecting and designing erosion and sedimentation control devices. Review innovative designs for erosion, sediment, and turbidity control for linear and vertical construction applications. Pick up new technologies as a plan designer to incorporate into a SWPPP that target turbidity control.

More than 130 technical sessions
The half-day and technical sessions offer attendees yet another area of continuing education. These technical sessions are comprised of innovative technical papers showcasing the latest research, inspiring case studies, thought-provoking forums, how-to workshops, and poster presentations by the industry’s up-and-coming professionals.

IECA suggests the following technical sessions for engineers:
• 99 Percent Sediment Yield Reduction in Two Easy Steps: A Case Study, presented by Barry Fagan, P.E., PLS, CPESC, CMS4S, CESSWI
• Large-Scale Performance Enhancement Study of Sediment Basin Technology, award-winning paper presented by Michael Perez
SAVING MONEY
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From shipping to site preparation, to installation and maintenance, Triton’s unique underground chamber design saves time and money.

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Field tours
This year, IECA is offering three field tour options. Field tours cost $30 for members and $35 for non-members and are based on first come, first serve. Spots fill up quickly, so book early.

Field Tour T: San Antonio River Improvements Project - Mission Reach (Feb. 18) — The San Antonio River Improvements Project includes the largest urban river restoration in the United States, as well as extension of the historic River Walk to both the north and south, expanding the opportunities for the 11.5 million visitors to San Antonio annually. The $384 million project is funded by Bexar County, the City of San Antonio, the U.S. Army Corps of Engineers, and private donations collected by the San Antonio River Foundation. The San Antonio River Authority is managing construction and provides operation and maintenance of the 15 miles of river, including the Museum Reach on the north end of the river and the Mission Reach on the south end. In addition to ecological improvements, the project provides recreational opportunities, connects four of San Antonio’s 18th century missions, which are important historical and cultural resources, and provides for significant economic growth opportunities, and a recently inscribed UNESCO World Heritage Site. This tour will leave from the hotel and take guests on a bus tour of the San Antonio River, stopping at many sites throughout the San Antonio Missions National Historic Park and other points of interest along the San Antonio River.

Field Tour F1: San Antonio River - Museum Reach/Underground Tunnels Tour (Feb. 19) — This will be a morning tour of the San Antonio River Museum Reach, River Walk, and San Antonio River Tunnel and the effort to reshape and control the waterway since the city’s founding in 1718. The San Antonio River Walk doubled in length with construction of the Museum Reach-Urban segment in 2009. The Museum Reach-Urban segment includes a two-chamber lock and dam, 1.3 miles of new walkways and landscaping, public art, and pocket parks along the San Antonio River as it meanders through the city. This section of the San Antonio River links downtown historic and commercial institutions such as the San Antonio Museum of Art and the Pearl Brewery to the historic River Walk.

Field Tour F2: Beckmann Quarry Tour (Feb. 19) — Aleisha Knochenhauer, regional manager - Environmental Services, will lead this morning tour of the largest limestone quarry in the United States. Uniquely situated adjacent to a high-end residential community and atop the Edwards Aquifer Recharge Zone, the sole-source drinking water supply of the City of San Antonio, the Beckmann Quarry showcases the implementation of a variety of erosion and sediment control techniques that are aimed at reducing impacts to sensitive environmental features. Quarry high walls depict the stratigraphic history of the former coral reef complex that has faulted and weathered to provide conduits for water to flow, via cracks and fissures, into a network of caverns beneath San Antonio. The regulatory framework for protection of this unique system includes technical requirements to reduce sediment in surface water within and downstream from this operation.

Education continues in the exhibit hall
The Environmental Connection 2016 Exhibition offers the latest products and services from more than 160 exhibitors. Get an inside look on new technology at Learning Lounge sessions, held Thursday...
and Friday in the expo hall. Plus, attendees have a chance to win prizes, including a smart tablet, on Thursday and Friday. Exhibit hall hours are Feb. 18 from 9:00 a.m. to 5:00 p.m. and Feb. 19 from 9:00 a.m. to 2:00 p.m.

On Thursday, Feb. 18, from 3:00 – 5:00 p.m., an opening reception with appetizers and drinks celebrates the opening of the Environmental Connection 2016 expo hall. Opening reception sponsors are Brentwood Industries and L&M Supply.

**Showcase of recent work**

IECA Poster Presentations are given by both industry professionals and our University Partners. They are based on scientific methods and merit, which will be described within the display/presentation. Presentations will be held Thursday from 1:30 to 3:30 p.m. The awards for the top three posters will be given out on Friday at 12:30 p.m.

**Special events**

While formal training will be the highlight of the educational experience at Environmental Connection, it’s ok to have a little fun, too! IECA takes pride in its networking events — outside the classroom. These events provide a relaxed environment ideal for making new business connections.

**General Session Breakfast: Triple Bottom Line Thinking at the San Antonio River Authority** — Kick off the Environmental Connection conference with a presentation from Steve Graham with the San Antonio River Authority (SARA). As SARA assistant general manager, Graham directs the administration and business of the operational and technical departments within the authority, including Watershed Engineering, Watershed Operations, Utilities, Environmental Sciences, Real Estate, and Parks, with a total of approximately 200 employees in these areas.

Competition for public resources at the local, state, and federal government levels is fierce. Communities are demanding maximum return and value on their tax dollars. This is particularly true of watershed protection and planning. SARA, along with its local counties and city governments, is developing watershed master plans, data, models, and capital projects that have multiple benefits and optimum return on investment using a triple bottom line methodology.

**IECA awards luncheon** — During lunch in the main ballroom on Wednesday, Feb. 17, sponsored by Informed Infrastructure, IECA will honor its 2015 Environmental Excellence; Sustained Contributor; Outstanding Professional; 2016 Technical Paper of the Year; 2015 Presenter of the Year; and Outstanding Chapters in 2015.

**A Texas Home Compañero** — Also on Wednesday, from 6:00 to 8:30 p.m., enjoy an evening of music and entertainment featuring The Sons of the Hydroseeders and the Daughters of the Purple Sage! This evening reception will have a live auction with amazing articles of antiquity and appeal. Dress up in cowboy-chic and get your two-step on! All proceeds benefit projects and programs of the SOIL Fund. Food and beverages will be included in admission, which is $35 per person.

**River Walk Closing Bash** — Back by popular demand, the Closing Bash (Friday; 3:30-5:30 p.m.) will be held at the LDR, which is located...
River-level of the Convention Center. The bash will be complete with gourmet food, drinks, entertainment, and cash prizes — IECA will be giving out $2,000 in cash! This is a free event for conference attendees. Plan to stick around and celebrate with IECA for the 2016 Closing Bash extravaganza, sponsored by Profile Products.

**IECA takes Alamo City**

All Environmental Connection 2016 activities (except full-day courses) will be held at the Henry B. Gonzalez Convention Center in downtown San Antonio. There are various lodging options just blocks away from the venue.

IECA has arranged for special pricing at four host hotels. The special pricing is valid until Jan. 25, 2016. For a full list of discounted hotels, visit www.ieca.org/travel.

**Registration tips**

Training courses for Environmental Connection sell out every year. For the best selection, register early.

An unlimited number of full conference and expo hall passes are available, but don’t wait to register onsite. Registration lines can be long, especially Wednesday and Thursday, and registration costs are higher. To save time, register using IECA’s secure online registration form. For more information or to register, visit www.ieca.org/engineering.

IECA’s annual conference provides peer-reviewed education through full-day courses and more than 130 technical sessions. **Photo: IECA**

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Arcadis promoted Akhil Chauhan to principal-in-charge in support of client development for Texas infrastructure clients. In his new role, Chauhan will lead business development efforts for the Texas Department of Transportation and other transportation agencies throughout Texas.

Tom Hill joined Freese and Nichols, Inc.’s Southeast Treatment, Transmission and Utilities Group. He will serve as a senior engineer with the Pearland, Texas, office to support the firm’s water transmission subpractice team. Hill has more than 35 years of expertise in hydraulic analysis of fluid piping systems associated with the oil and gas industry, municipal water industry, power plants, and refineries.

Samir Avdic joined the staff of H2M architects + engineers as a senior project engineer, supporting the firm’s water supply and water treatment projects. He has more than 25 years of experience working in the government and private sectors, and has worked with mining and utility industries throughout Europe and Australia.

Fishbeck, Thompson, Carr & Huber, Inc. (FTCH) announced that three new employees recently joined the firm. Melissa Salich, GIS specialist, gained experience in the public sector as a GIS engineering intern and as a water/wastewater GIS intern. Brittany Schuel, civil engineer, comes to FTCH from IBI Group Michigan, LLC, where she was involved in a variety of bridge design projects. Sarah Rutkowski, water/wastewater engineer, brings to FTCH experience as a water resources engineer participating in modeling and analysis for wastewater collection and water distribution projects within an asset management team.

Urban Engineers hired Michael Mastaglio, P.E., PTOE, as deputy traffic practice leader. He has almost 20 years of experience in all aspects of roadway, intersection, and unconventional interchange design, with particular expertise in the policy, planning, traffic, engineering, design, and construction of multi-lane roundabouts.

Ned Codd, P.E., will lead transportation planning teams as a senior supervising transportation planner in the Boston office of WSP | Parsons Brinckerhoff. Before joining the firm, he served as an assistant secretary at the Massachusetts Department of Transportation. John Fisher was appointed the San Francisco area manager for WSP | Parsons Brinckerhoff. In his new position, he is responsible for leading the firm’s transportation and infrastructure operations in the San Francisco Bay Area. Vahid Karimi, P.E., joined the firm as a vice president and will serve as traffic engineering practice lead for New England. The Institute of Transportation Engineers selected Scott Walker, a lead traffic engineer in the Lexington, Ky., office of WSP | Parsons Brinckerhoff, as the 2015 Young Member of the Year.

Detroit-based Sigma, a multi-disciplinary consulting firm, named Jay Shah as the firm’s president. Shah previously served in several high-level executive roles within the industry, including president and chairman of a large engineering and consulting firm, and has experience in all areas of engineering and infrastructure consulting and management, including complex water/wastewater, transportation, and environmental programs.

Peter Guest, P.E., joined Arup in its New York office. As part of the infrastructure team, Guest brings extensive experience in rail, transit, design-build, and major project delivery and has led negotiations for large, complex engineering and rail and transit projects.

Freddy He, Ph.D., a senior transportation engineer in Stantec’s Denver office, was elected president of the Institute of Transportation Engineers’ Colorado/Wyoming branch for the 2015-2016 year.

Keith M. Ivy, P.E., joined R. G. Miller Engineers, Inc., as project manager for the firm’s Public Works Department. Ivy has more than 10 years of design and management experience related to roadways, municipal utilities, and site development.

Michael Baker International announced the retirement of Bob Kallenbaugh, P.E., senior vice president and Irvine, Calif., office executive. A 40-year industry veteran, Kallenbaugh joined Michael Baker International in 2011 when the company acquired West Coast-based RBF Consulting, where Kallenbaugh served as co-CEO. Michael A. Tylman, P.E., operations manager in San Diego, was selected to serve as the new Irvine office executive.
IN 15 YEARS, 50 percent of the world’s population will live in urban areas, 75 percent of the world’s energy will be used by cities, and 90 percent of population growth will occur in cities, according to various forecasts. As a result, cities must have the assets not only to support those resource needs, but also to provide environments that promote quality of life and long-term economic development. As their needs change, cities increasingly will require the expertise of professional organizations with integrated, comprehensive capabilities to help them define the ways people will live, work, travel, and interact in urban communities in the future.

In October 2014, WSP, an international engineering and professional services firm based in Montreal, acquired Parsons Brinckerhoff, a global engineering and construction management firm founded in New York City in 1885. With the integration of the two firms, WSP | Parsons Brinckerhoff formed a unique organization capable of taking on the kinds of complex urban projects that represent the future of consulting engineering, according to Gregory Kelly, president and CEO of the firm’s U.S., Central and South America region. As a diversified, multidisciplinary consultancy, the firm has preeminent skills in structural and systems design and engineering for buildings and planning and design for transportation systems, as well as recognized capabilities in the environment and industrial/energy sectors.

“Throughout their histories, each firm has helped to define the landscape of our great cities, not just through the buildings and infrastructure they have planned, designed, and implemented, but in the way these
projects have become catalysts for major development initiatives that drive economies and provide opportunities for communities and their residents,” Kelly said. “Now, as one multidisciplinary organization, we are transforming the way we approach complex challenges in urban environments.

“As an integrated firm in the United States, we partner with state and local government agencies and private developers to resolve challenges and define the ways people will live, work, travel, and interact in the 21st century,” Kelly said. “We recognize that we must work together to advance the country’s transportation networks to provide mobility and connectivity across multiple modes, and to incorporate sustainability and resiliency into urban infrastructure. At the same time, we must plan for new types of commercial, office, and residential development that can meet the demands of an increasingly urban and connected world.”

WSP | Parsons Brinckerhoff

Headquarters: Montreal, Canada
Size: 34,500 employees in more than 500 offices
Ownership: Public
Website: www.wspgroup.com
Primary services: Design, engineer, and manage property and buildings, transport and infrastructure, industry, environment, mining, oil and gas, and power and energy projects.

The integration of WSP | Parsons Brinckerhoff has created one of the leading engineering and professional services firms in the world, with projected 2015 revenues of CAD $6 billion and 34,500 professionals located in more than 500 offices in 40 countries. Headquartered in New York, the U.S., Central and South America region employs more than 7,000 professionals in more than 100 offices, with projected revenues of CAD $1.9 billion in 2015.

Hudson Yards: The ‘next frontier’ for Manhattan development

The Hudson Yards development on the far west side of midtown Manhattan is a prime example of how the combined capabilities of WSP | Parsons Brinckerhoff contribute to the kind of urban communities that cities will want to create in the future.

For an extension of the No. 7 subway line to a new station at Hudson Yards that opened in September, WSP | Parsons Brinckerhoff provided conceptual, preliminary, and final design; assisted the Metropolitan Transportation Authority in developing an overall construction program and contract packaging arrangements; provided construction support services; and served as systems integrator, responsible for ensuring that all mechanical, electrical, and plumbing (MEP) and technology systems, as well as all train and station control, security, and communication systems, performed as intended by the design.

Included in the original design contract was the preparation of an environmental impact statement (EIS) for the No. 7 line extension that also laid the groundwork for the eventual expansion and modernization of the Jacob Javits Center and rezoning of much of the west midtown
area for commercial and residential development. The eight-volume, 6,600-page EIS has been called one of the most complex documents of its kind in New York history.

Currently, WSP | Parsons Brinckerhoff is performing structural and/or systems (MEP) engineering for several high-rise buildings at or near Hudson Yards, including 55 Hudson Yards, a 51-story office tower; 15 Hudson Yards, a 70-story residential high-rise; and 3 Hudson Boulevard, a 67-story mixed-use structure that integrates the Hudson Yards 34th Street subway station in its base and is aiming for LEED Platinum certification.

“The opening of the new station, and our ongoing role at Hudson Yards, is a powerful demonstration of the comprehensive transportation planning and design and building engineering expertise that enables WSP | Parsons Brinckerhoff to contribute to the kinds of diversified initiatives that will define urban areas in the future,” Kelly said.

**The slender revolution**

With a width-to-height ratio of 1:12, 15 Hudson Yards is an example of the “slender revolution” in New York, which is using innovative design and engineering to increase density in constrained urban spaces.

WSP | Parsons Brinckerhoff is also performing structural design and MEP engineering for several noteworthy buildings elsewhere in Manhattan, including “super slender” buildings with extraordinary width-to-height ratios.

Among those are 432 Park Avenue, which at 85 stories and 1,396 feet is the tallest residential building in the Western hemisphere, and currently the most slender building in the world with a width-to-height ratio of 1:15; 53W53, an 82-story residential tower adjacent to and incorporating...
the Museum of Modern Art, with a width-to-height ratio of 1:13; and 111 West 57th Street — “the world’s skinniest skyscraper” — with a width-to-height ratio of 1:24. The firm’s integrated design approach to building services and structures optimizes the efficiency and performance of these super-slender structures in terms of space and energy utilization and human comfort.

Atlantic Yards: Pushing the boundaries
As at Hudson Yards, WSP I Parsons Brinkerhoff has made significant contributions to the Atlantic Yards development in Brooklyn — a site that is located at a crossroads of residential neighborhoods, the downtown Brooklyn commercial core, and continued commercial and cultural developments. It includes Brooklyn’s largest transportation hub at Atlantic Terminal, which serves the Long Island Rail Road as well as nine subway lines.

The firm redesigned and improved the rail yard to accommodate the planned development, designed the foundation and columns of the platform that supports high-rise buildings to be built above the rail yard, and designed the MEP systems for six of the buildings to be built on the site, including the Barclays Center.

The project required close collaboration of the firm’s transportation and buildings professionals to design complex infrastructure improvements and the needed foundations and columns within the yard while ensuring that there would be no interruption of rail operations.

The result is one of the most desirable residential and commercial developments in the country, which includes an 18,000-seat sports and entertainment arena, 6,000 units of housing, and a large area of public space.
“We were instrumental in making this entire 8.4-acre site possible for development,” Kelly said. “We helped to reunify previously separated neighborhoods in Brooklyn’s core, which has had a transformative effect that will enhance the vibrancy of the community and business district for generations to come.

“Hudson Yards and Atlantic Yards are among the most notable infrastructure developments in the country, but they are just two examples of the kinds of opportunities we see to contribute to the planning and design of urban environments that meet the highest standards for livability, connectivity, resiliency, and sustainability,” Kelly said. “The challenge for us going forward is to integrate the experience and expertise of all our sectors — buildings, transportation, environment, and energy — to transform urban areas for the way people will live and work in the 21st century.”

BRUCE ROSS, based in New York City, has more than 30 years of experience writing about architecture, engineering, and construction firms and their projects.

U.S., Central and South America portfolio

In the U.S., Central and South America region, the portfolio of WSP | Parsons Brinckerhoff includes notable current and recent projects in the buildings, environment, industrial/energy, and transportation/infrastructure sectors, including:

- One World Trade Center — Structural engineer for One World Trade Center in New York City, the tallest building in the Western Hemisphere.
- Southeast Federal Center — Design of an environmental remediation plan for the Southeast Federal Center in Washington, D.C., a facility of the U.S. General Services Administration.
- Presidio Parkway — Planning, design, and advisory services for a new roadway through the Presidio of San Francisco.
- Cauca-Nariño Interconnection — Design services for 325 miles of power lines and nine power substations in the Pacific region of Colombia.
- Anaheim Regional Transportation Intermodal Center — Project management services for a multimodal transit hub in Anaheim, Calif.
- Valley Metro Central Mesa Light Rail Extension — Program and construction management for an extension of the Valley Metro light rail system in Mesa, Ariz.
- Clemens Cavern Terminal — Engineering, procurement, and construction management services for caverns for the storage of liquid natural gas near Lake Jackson, Texas, for Phillips 66.
- Transbay Transit Center and Salesforce Tower — MEP and building technology systems engineering for the Transbay Transit Center in San Francisco and design of building services for a 61-story mixed-use tower atop the transit center.
- Tidal Back River Greening — Design plans and construction support services for a project to control stormwater runoff to the Back River and Chesapeake Bay, Maryland.
- Dell Children’s Medical Center — MEP engineering for the W.H. and Elaine McCarty South Tower at the Dell Children’s Medical Center in Austin, Texas.
CREATING THE PERFECT RFP
LIMIT 'BORROWED' CONTENT FROM PREVIOUS RFPS AND FOCUS ON CURRENT PROJECT NEEDS AND TECHNICAL CRITERIA.

By Bernie Siben, CPSM

EVERY A/E INDUSTRY marketer that I’ve met in my 37-year career has had at least one experience (gross understatement!) with a public agency RFP that made them scratch their head and wonder, “Why are they asking for that?” or, “Is that requirement really applicable to the current need?” Recently, I wrote a blog post about these RFQ/RFP issues. I received a few comments, including one that said, “These issues have been a problem for a long time with no improvement in sight.”

As a response to that comment, I started thinking about what the perfect RFP would look like. This is what I came up with. In my fondest dreams, a public-sector purchasing officer would do the following:

First, and most important, forget about “borrowing” an RFP from the person down the hall. His/her service/product need is different from yours, so a borrowed RFP might hurt more than it helps. And if you borrow an RFP from a similar procurement two years ago, the technology might have changed dramatically since then; again, a borrowed RFP might hurt more than it helps.

So you have to start with a blank screen! I know that a blank screen — just like a blank page — scares many people, but the following suggestions (see Table 1) provide an outline that makes things easier.

**Cover letter**
Many agency purchasing staff omit this, with the first page of the RFP being the Table of Contents. Include a cover letter or not; it’s your choice.

**Introduction**
- Brief description of the project, including the type of project (planning, design, permitting, construction, etc.); the facility type (building, roadway, pipeline, etc.); and the project location (the address, if a vertical project; the boundaries, if a linear project).
- Why the project is needed.
- The project’s importance to the community or the agency.
- Why the project is happening now.
- Where the funding is coming from.
- Who has permitting approval or other jurisdiction, or right of review/approval.
- Whose design or construction standards must be met.
- “Hot buttons” for the project: Are you more focused on time, construction cost, fee, smooth team interaction, or some other factor?

**Overall RFP and project schedule**
- RFP release date.
- Pre-proposal meeting — is attendance mandatory or voluntary?
- Deadline for submitting questions.
- Due date/time for proposals.
- Anticipated release date for short list.
- Dates for short-list interviews.
- Agency approval of staff selection.
- Notification of selected firm and negotiation of scope/fee.
- Notice to proceed.
- Project completion.

Packaging and delivery instructions
This section explains how the submittal should be assembled, packaged, labeled, and delivered.

Assembly — Some agencies stipulate using three-ring binders or just a staple in the top left-hand corner. One Texas city required submittals in View Binders; after selection, they removed and filed the pages and reused the binders, reducing their own spending on office supplies. If you have specific desires regarding assembly, put them here.

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*Your choice **Could be part new and part tweaked boilerplate

Table 1: RFP checklist
Packaging — If you want submittals packaged in a specific way (i.e., in a box rather than an envelope), include an instruction. If you want a cost proposal in a separate envelope so it is not seen until after technical selection, include an instruction.

Labeling — If you want submittal packages labeled in a specific manner or in a specific location, put the instructions here. If you want a specific label to be used, include it so it can be printed, filled in, and attached to the package.

Delivery — Some agencies have a delivery address that is different from the contracting officer’s address (shipping/receiving desk, etc.). If so, specify that address. Some agencies require or prohibit specific delivery methods. For example, RFPs from the U.S. Postal Service often state that they will only accept packages delivered by hand or by one of their own delivery services. They will refuse any submittal delivered by FedEx, UPS, DHL, etc. If you have a preference, or a requirement, this is the place to say so.

Preliminary scope of work
If the project is vertical (a building), include the following information:
- Location and approximate size of project site.
- Number of floors and approximate square footage.
- Security and other high-tech requirements.
- Code requirements of what jurisdiction.
- What permit(s) will be required and how long they generally take to obtain.
- Public hearings/meetings or other community liaison required.
- Project milestones (percent complete) at which you want to review progress.
- Whether the project will be divided into multiple construction packages.
- Any specific challenges to be overcome.

If a linear project (a roadway, bridge, pipeline, transmission line, etc.), include the following information:
- Project boundaries (from where to where).
- Approximate length of project and width of right-of-way.
- If a roadway, number of lanes, median, controlled access.
- If a pipeline, pipe width, pipe depth, system connections.
- Whether the facility crosses a stream, a roadway, or any geologic feature that would complicate the design.
- Whether the project requires acquisition of new right-of-way or obtaining construction easements.
- Design standards of what agency?
- Required permit(s) and how long they generally take to obtain.
- Required public hearings/meetings or other community liaison.
- Project milestones (percent complete) at which you want to review progress.
- Whether the project will be divided into multiple construction packages.
- Any specific challenges to be overcome.

Evaluation criteria
This is a discussion of what the submitting firm/team must demonstrate and how. It might include the following and others:
- A listing of evaluation criteria prioritized from highest to lowest, or grouping as high or low (many federal RFPs have done this for a long time).
- How the relevance of specific example projects will be judged.
- Challenges and solutions of specific example projects.
- How many staff of each technical discipline are required, and how many of them need resumes.
- What experience you have with the design criteria of the various relevant agencies/jurisdictions.

Submittal
This section is a listing of the information the agency wants firms/teams to submit. It should include the following:

Administrative issues — Date and time for delivery, delivery location, document organization, page size and font instructions, original plus how many copies, unbound or digital copy, etc.

Table of Contents — Show the level of detail (section titles, section and subsection titles, etc.) with page numbers.

Executive Summary — Detail all of the information you want to see in this section. For example, some RFPs stipulate that the Executive Summary be a discussion of the firms that make up the team, while others want to see what evidence you will be presenting and how it is organized. An Executive Summary is whatever you want it to be as long as you explain what you want.

Project understanding and approach — These two items should be the first proposal section. If a firm/team cannot show that it understands the project and has a workable approach, you really don’t need to read 25 to 50 or more pages about the firm’s/team’s staff and project experience.

The firm — Relevant information about the capabilities of the prime firm, followed by descriptions of relevant project experience. If project references are desired, specify the exact information wanted, as well as information on any proprietary equipment, software, or other assets the firm brings to the project.

The team — Relevant information about each subconsultant firm, including descriptions of each firm’s relevant project experience. If project references are desired, specify the exact information wanted, as well as information on any proprietary equipment, software, or other assets each firm brings to the team.

Proposed project staff — Include an organization chart; if desired, specify the positions you want noted on the chart. If you want a special section about the project manager, indicate as much; if you want to know how many staff members the prime firm and/or the team has for each technical discipline required to complete the project, indicate as much.

Appendix: Required forms — Any forms that are truly relevant to the project. Consider eliminating any form that is requested simply because “it’s always included” in submittals to your agency.

Appendix: Detailed resumes — List the positions for which you want to see detailed resumes and the specific information you want about those individuals.
Miscellaneous additional items
If there are any other desires, needs, or requirements that don’t seem to fit into the above categories, this is the place to include them.

Using boilerplate
There is no need to recreate the wheel. Using boilerplate in an RFP is fine if you remember to tailor it to the current solicitation. Any of the following sections or subsections might include boilerplate:

**Introduction** — The agency’s history, make-up, decision/selection process.

**RFP schedule** — Use the list of milestones, change the dates to reflect the current solicitation, and delete those milestones that will not be part of the current process (i.e., pre-proposal meeting or deadline for questions).

**Packaging and delivery** — If you always want a certain kind of binding, if you always want specific information in a specific location on the outer packaging, if you always take delivery at a shipping and receiving desk regardless of the contracting officer’s office location, these things can be paragraphs in the boilerplate.

**Preliminary scope of work** — Since no two projects are ever identical, the only boilerplate use might be the milestones at which reviews occur.

**Evaluation criteria** — These may be identical, or at least similar, from one project to another, so they may be used as boilerplate if you check to ensure that you are not using any criteria that are irrelevant to the current solicitation and that the priorities are correct.

**Submittal** — If you always want the same information on the submitting firm/team, you could make the suggested Table of Contents part of the boilerplate, but make sure that any additions or deletions are reflected in the final Table of Contents. The same goes for any forms, but make sure 1) that new forms are added to the boilerplate, 2) that updated forms replace older versions in the boilerplate, and 3) that any form not relevant to the current solicitation is not used.

**Miscellaneous** — Assuming that a miscellaneous section would be for items relevant specifically to the current solicitation but rarely used for others, a miscellaneous item would rarely make it into the solicitation document.

**One last reminder**
If you start with a good outline for the solicitation based on specific project needs and the technical criteria that must be satisfied, and make sure that such revisions are made in every location in the solicitation where such needs and criteria are discussed, you won’t have to worry about contradictory instructions or requirements in the RFP.

BERNIE SIBEN, CPSM, is owner and principal consultant with The Siben Consult, LLC, an independent A/E marketing and strategic consultant located in Austin, Texas. He can be reached at 559-901-9596, through his website at www.sibenconsult.com, or at bernie@sibenconsult.com.
SHARING INFORMATION and collaborating with internal and external colleagues is an inherent part of every engineer’s job. In any given project, CAD files and agreements are being sent back and forth for reviews and approvals and information is being accessed from and saved to various systems and devices. However, if this type of activity is taking place in an unregulated and unauthorized manner, it can put firms at significant risk.

Some firms do not have explicit policies in place related to the use of personal devices and solutions (such as Dropbox or other file-sharing and sync apps). And in cases where companies do have such policies in place, some employees either don’t know about them or simply disregard them. This creates practical challenges ranging from not only the obvious security risks, but also related to version control and ensuring appropriate workflows are followed.

On an actionable level, the issue of unauthorized file sharing should alert IT and management about the need to better accommodate staff needs and for a simple yet comprehensive information management approach that reduces risks.

How prevalent is unauthorized employee file sharing?

Very. Information technology research and advisory company Gartner summed up the problem in its report, Respond to Employees’ Use of Consumer File Sharing With ‘Easy Content Management’: “Employees continue to use consumer online file-sharing tools for sensitive documents, even when their company has banned the use of such tools. Employees’ use of consumer online file sharing in defiance of corporate rules reduces the influence of enterprise content management (ECM) program managers over content and could put the enterprise at risk.”

How much at risk? M-Files conducted an online survey of hundreds of working professionals. Nearly half (46 percent) of respondents said they have stored confidential company information on their personal file-sharing and sync apps. We also found that 56 percent of employees said their company does not have policies in place that prohibit the use of personal file-sharing and sync solutions for storing and sharing company documents.

The survey also revealed the consequences, pervasiveness, and reasons for these rogue practices:

- 25 percent of employees say their company has experienced information security breaches, data loss, non-compliance issues, loss of control over documents, or other issues from employee use of personal file-sharing and sync tools.
- 37 percent of employees said they store and/or share business documents via their personal file-sharing and sync solutions “all of the time,” while 47 percent said they do so infrequently.
- Of the 61 percent of employees who cited that their company uses an ECM or document management system, only 39 percent said that their ECM or document management system integrates with their file-sharing and sync applications.

What’s perhaps most interesting about this data is what it says about the idea and practice of information management-driven policies. While one-fourth admitted being subjected to significant risk from unauthorized practices, almost half still did it anyway.

These statistics belie the contradictory but entirely understandable nature of unregulated file-sharing practices. Whether intentionally or not, employees utilize these tools because they are a familiar and
readily available means to an end. They get the job done — maybe not the way it could or even should be from an IT perspective, but it is the way the job is, in fact, getting done.

Gartner summarizes it this way: “Employees use these tools because they enable them to be more productive across networks (public, private, and secure), devices, and [operating systems]. Using such tools also enables them to collaborate with their business partners, such as contractors, temporary staff, and contacts in other companies. Employees like the ease-of-use of consumer tools … which enable them to be more creative and innovative in their work.”

Unauthorized practices are taking place whether organizations know it or not. People are sharing documents and information internally and externally using apps such as Dropbox. If organizations don’t provide an information management solution their staff wants to use, employees will find their own.

These unauthorized practices, as prevalent as they are, can be seen as a direct result of having an information management strategy that gets hamstrung by being out of date, maybe even out of touch with the needs of the organization. If employees don’t use and follow sanctioned information management systems and policies, it’s because they’re just too complex, or simply inconvenient, at least compared to what they’ve been using everyday outside of work. Add to that the inherent difficulty of finding anything from the folder structures and document libraries of these systems and we can understand why employees aren’t using them.

Armed with an authorized platform

The challenge for organizations is to not simply prohibit and exclude employee practices and behavior because that simply doesn’t work. Instead, organizations can see rogue practices as an opportunity to equip their staffs with simpler, intuitive solutions that address employee needs while ensuring security and reducing risk.

When organizations reposition their information management strategy around the ability to quickly and easily access and share information, they go a long way toward securing user buy-in while supporting enterprise compliance and security. Implementing a sanctioned information management solution that prioritizes the ease of use for which employees had once looked to personal file sharing apps meets the challenge of discouraging unauthorized practices.

A sanctioned solution can also be tailored to enforce information protection policies as well as automate and track information-related workflows, which gives IT broader content management capabilities and company-wide visibility. IT gets a more comprehensive, 360-degree view of the enterprise while adapting to employees’ changing needs and responsibilities, and employees become armed with a sanctioned platform they’ll actually use.

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DESIGNED FOR SALT STORAGE
SALT COMPANIES AND TRANSPORTATION DEPARTMENTS TURN TO FABRIC BUILDINGS TO ELIMINATE CORROSION.

ALTHOUGH SALT IS basically a limitless resource, the last two winters saw shortages of the substance across the country because of not only the severity of the weather, but also diminished storage capacity. A contributing factor to that situation is the corrosive property of salt. When salt comes into contact with metal storage sheds, the metal corrodes. Fabric, however, does not corrode, so it’s becoming an increasingly popular alternative for salt storage buildings.

Minnesota-based Legacy Building Solutions, a supplier of tension fabric buildings, has designed and installed dozens of customized salt structures for departments of transportation and private salt companies throughout North America. While using the same engineering that has been employed by the metal building industry for many years, the firm develops highly flexible fabric structures that are more responsive to the specific needs of clients. Unlike standardized, prefabricated buildings, this design-build model accommodates the many different door/access configurations, load conditions, and mechanical systems that are needed by commercial salt handlers.

This approach directly addresses the value-driven equation often faced by salt-facility owners. By incorporating customized details and corrosion-resistant construction at the beginning of the design phase, Legacy is able to raise the ROI for its clients by minimizing building maintenance and extending the lifespan of their buildings.

Central Salt, Lyons, Kan.
Corrosion nearly undermined Lyons Salt Company’s business. Now part of Central Salt, this industrial supplier of deicing salt and agricultural feed salt products was faced with the premature degradation of one of its two main containment facilities. Although it was constructed in 2005, the building’s open web trusses and exposed support cables were already showing signs of irreversible rust, triggered by the salt. Legacy was enlisted to replace the 162-foot by 300-foot shelter with a design that could endure the challenging environmental conditions.
Following up on meetings with Lyons, the Legacy team of engineers made specific recommendations to maximize the corrosion-resistance of the proposed structure:

- Use a rigid, hot-dip galvanized steel frame. Unlike the old web-truss structure, the new system does not depend on wire cables — which are vulnerable to rust, slackening, and breakage — to provide support. Instead, solid steel rods brace the building.

- Seal the ends of the purlins with caps to prevent corrosive salt dust from collecting inside them. Sealed purlins are far superior to the structurally unsound smashed-end purlins that have long been used by the industry.

- Insert a fabric liner on the interior of the building, secured tightly to the steel frame, to provide an additional protective barrier against corrosive elements. Legacy created the fabric liner to protect the building’s framing. This easily installed physical barrier adds years to the life of the building.

- Install two ventilation systems to control corrosion-inducing moisture. Ten roof vents aerate the buffer space formed by the fabric liner, while dampness in the main storage area is alleviated by a combination of painted aluminum louver intakes and molded polyethylene roof vents.

Once Lyons approved the design in fall of 2014, a Legacy crew demolished the dilapidated structure and erected its 48,600-square-foot replacement in just 30 days. The new structure was specially designed to the same dimensions and roof pitch as the demolished structure, which connects it to an existing storage building.

**CM & Son Trucking Inc./C.T.M. Bulk Handlers Inc., Bloomingburg, N.Y.**

CM & Son Trucking Inc. and C.T.M. Bulk Handlers Inc. provide salt to several surrounding townships. In 2013, the company purchased two 41,275-square-foot Legacy fabric buildings, each with a capacity of 50,000 tons, after its existing tubular steel buildings were brought down by snow and ice. CM & Son chose Legacy buildings for two reasons: the steel I-beam structure and the warranty.

“The old buildings used tubular steel, and no matter what you do, the salt gets inside the tubes and corrodes them,” said Theo Gatsonis, vice president. “Legacy was very easy to work with. They came out here with their crew, rented all their equipment, and erected each building in three weeks — to finish a week ahead of schedule.”

**Northern Salt, St. Paul, Minn.**

Having outgrown its steel salt-storage structure, the management of Northern Salt was drawn to the fabric solution because of its resistance to corrosion and time-efficient installation. Most fabric structures can be installed two to three times faster than conventional buildings. Compared to steel sheeting, which requires 0.04 to 0.07 man hours/square foot to install, fabric structure installations clock in at 0.02 to 0.03 man hours/square foot. The savings from such a rapid build-speed can be considerable.
The St. Paul-based supplier of commercial and industrial deicing salt enlisted its fellow Minnesotans at Legacy to design and build a 12,800-square-foot fabric storage building to hold 10,000 tons of salt, which it sells to counties, cities, townships, and commercial businesses in the region. As with Central Salt, speed was a factor — the building took 10 days to build.

“Legacy’s customization options were impressive, too,” said O.J. Rinehart, president/CEO. “Our salt is delivered from our suppliers by rail cars to a large pit next to the storage structure. A conveyor system hoists it from pit to building. Legacy was the only company we talked to that could supply trusses strong enough to support the conveyors.”

The building is anchored by cast-in-place concrete and uses precast concrete containment walls positioned at the interior perimeter. Because the walls of the building are modular, they can be reconfigured or sold, so are not a sunk cost if operational demands change. The fabric stops a few feet above grade, which reduces cost and facilitates airflow — crucial in corrosive environments.

In addition to private companies, Legacy also supplies government agencies with salt sheds.

Indiana Department of Transportation, Indianapolis
When the Indiana Department of Transportation (INDOT) was looking to replace its older salt buildings, the goal was to provide structures that could reduce service time during a snow fight and to provide an environmentally compliant and safe salt facility. To achieve this, Legacy Building Solutions worked with INDOT to develop a new building model that not only provides complete containment of salt, but also accommodates loading and offloading of salt under roof, a complete brine-making and wash water reuse system under roof, and a truck pre-wash station under roof.

The new buildings provided by Legacy feature galvanized I-beam construction, roof ice guards, passive ventilation, and a fabric roof system. Now INDOT’s preferred design, the structures can be adjusted in size as needed.

Ohio Department of Transportation, Euclid, Ohio
The Ohio Department of Transportation’s Design-Build Team chose fabric for its affordability and performance. Legacy customized the 6,000-ton capacity salt storage building with mix materials bins and a decanting station for highway debris. A 12-foot cast-in-place concrete foundation supports the building, which also features an offset peak and an open end wall for easy access.

Across North America, departments of transportation and private salt companies can now stock sufficient salt and ice-melt for the winter, thanks to advances in fabric technology.

Information provided by Legacy Building Solutions (www.legacybuildingsolutions.com).
Join the webcast to learn about the new CONNECT Edition release of SITEOPS software for conceptual site design featuring integration with Bentley Cloud Services. The CONNECT Edition provides a common environment for comprehensive project delivery and connects users, projects, and enterprises.

SITEOPS is a powerful differentiator for site design and land development firms providing optimized site designs that include budget, grading plan, and stunning 3D models. Using SITEOPS, engineers simply upload a digital terrain model of the proposed site and enter design requirements such as building footprints, parking requirements, setbacks, roadway parameters, and other constraints.

You will learn the following from the webcast:
- Use SITEOPS to weigh thousands of options and discover the most optimized design.
- Employ grading and stormwater drainage tools to generate the most cost-effective plan.
- Use the Personal Portal to access online learning materials, communities, and support resources.
- Create documents needed for project review and production with the new Documentation Center.
- Integrate with LumenRT to develop realistic 3D models.

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In the spring of 2015, Emory University in Atlanta commissioned an innovative campus water reclamation and reuse system known as the WaterHub. Treating up to 400,000 gallons each day, the system can recycle the equivalent of two-thirds of the university’s wastewater production and reduce the campus water footprint up to 40 percent.

In less than one year, the WaterHub at Emory has garnered a lot of attention in the water industry, having been named the 2015 Innovative Project of the Year by the WateReuse Association (WRA), the industry’s leading research institution for the advancement of water reclamation and reuse. Sustainability enthusiasts, including Gina McCarthy, administrator of the U.S. Environmental Protection Agency (EPA), have dubbed the WaterHub at Emory “a model for us all” for onsite water management.

Perhaps the first system of its kind installed in North America, the WaterHub at Emory mines wastewater from the campus sewer system and repurposes it for beneficial reuse using an engineered blend of technology and nature. In its first month of operation, the facility reclaimed 6.2 million gallons of water, and is expected to save millions of dollars in water and wastewater utility costs for the university over a 20-year period.

Perfect storm of water-related challenges
Located only 15 minutes from downtown Atlanta, Emory University has witnessed the perfect storm of water-related challenges. In Metro Atlanta, consistent seasonal drought is exacerbated by the region’s location in one of the smallest watersheds for a metropolitan area of its size. Regional water stress is further compounded by a long-standing political dispute over rights to water supply between Georgia and the neighboring states of Florida and Alabama.

Unfortunately, these difficulties are only part of the story when discussing the region’s many water stresses. Aging infrastructure not only negatively impacts level of service, but in some cases has resulted in federal consent decrees to resolve critical infrastructure failures, which have and will continue to result in skyrocketing water and wastewater costs to most utilities in the region.

In addition to its functional use as a water reclamation facility, the WaterHub at Emory can be used as an immersion learning tool to enhance curriculum and advance research. The Rollins School of Public Health has already demonstrated interest in performing research associated with reclaimed water quality. Emory’s faculty believes this facility will also bring in additional research funds and enable the university to qualify for new grants. Photo: courtesy of Sustainable Water
Consequently, sustainable water management has become a critical issue for the region and a specific operational focus for large water consumers in the Metro-Atlanta area. Using close to 350 million gallons of water annually, Emory University began to deploy somewhat conventional water conservation tactics ranging from low-flow fixtures to stormwater reuse systems. However, the magnitude of the stresses and challenges dictated a more strategic and impactful water management solution: campus-wide water reclamation and reuse.

Campus watershed
Emory University is known as a top-tier research institution recognized for its medical school and various professional programs. Like most major universities, Emory is a bulk consumer of clean, potable water and, thus, is a significant producer of wastewater discharge. In 2014, the university consumed more than 330 million gallons, despite significant cuts in potable water consumption over the years. Of this, 40 percent is considered non-potable demand, or uses for which scarce potable-quality water is neither required nor cost effective.

The largest categorical use of campus water is for utility (heating and cooling) functions. Emory has five major chiller plants and one steam plant that provide critical heating and air conditioning services to the campus. Together, these six utility plants consume 30 percent of total campus water supply, or approximately 105 million gallons annually. Extensive non-potable water demands at centralized locations presented a unique opportunity to displace potable water through a campus-wide water reclamation strategy.

Water reclamation through ecological design
In 2013, the university engaged with Sustainable Water to design a reclamation system that could offset extensive campus utility water demands. Sustainable Water and its development team — including the engineering, surveying, and planning firm of McKim & Creed, Inc. and contractor Reeves/Young — designed Emory’s water reclamation system utilizing the latest techniques in ecological engineering. Needless to say, the WaterHub — considered an adaptive, ecological wastewater treatment system — looks much different than traditional biological or mechanized treatment processes.

The facility was planned to occupy two small disconnected and underutilized areas wedged between other structures. Due to the topography involved, these areas have come to be known as the “upper site” and “lower site.” The upper site houses the major feature — a 3,000-square-foot glasshouse that resembles a greenhouse and contains the initial stages of the hydroponic reactors. The lower site features a series of largely underground concrete processing tanks.
(including additional hydroponics and reciprocating wetlands) whose upper few feet are visible above ground. This above-ground portion appears to be ornamental landscaping, but beneath the surface is a highly engineered system that processes 400,000 gallons of raw wastewater daily.

How the system works
The WaterHub’s reclamation process begins with wastewater extraction from an 18-inch municipal sewer line. Raw sewage is extracted from a sewer interceptor and pumped to the upper site through a self-cleaning primary fine screen to remove debris entrained in the wastewater. Flows exiting the screen discharge directly into the initial treatment reactors.

Typical primary treatment settles and removes heavier solids. Unfortunately, primary treatment can be a significant source of potential odors and can remove a source of food that enables certain biological processes to function most efficiently. To significantly reduce this risk while also balancing food sources for biological nutrient removal, primary treatment at the WaterHub is handled only by screening, followed immediately by a series of moving-bed bioreactors (MBBR) able to operate selectively as anaerobic, anoxic, or aerobic. The sealed MBBRs, with access through airtight hatches, vent all gasses through activated carbon air filters, eliminating virtually all odors from the primary treatment process.

The three MBBRs are located behind the glasshouse (see Figure 1). In addition to typical suspended growth, a neutral buoyancy plastic substrate is colonized by various bacteria that form an attached biofilm; this begins the biological treatment process. These MBBRs utilize coarse bubble diffusers and mixers that selectively supply oxygen and mixing energy to achieve optimum biofilm thickness and growth. Stainless steel screens on the inlet and outlet pipes retain the media inside the reactors.

The first MBBR was designed as an anoxic reactor to “select” for the growth of microorganisms. This provides denitrification by selectively stripping the oxygen for nitrates and nitrites for their respiration, thereby liberating nitrogen as harmless offgas.

The next two MBBRs are aerated with coarse bubble diffusers. They are the first fully aerobic portion of the treatment process and remove a large fraction of the carbonaceous material, measured as biochemical oxygen demand (BOD), in the influent. They also strip odorous gasses and begin conversion of ammonia to nitrates and nitrites for eventual recirculation and decomposition in the anoxic zones.

Hydroponic reactors follow the primary MBBRs and are located within the glasshouse. These reactors reduce remaining BOD to secondary levels and complete the nitrification process. These
Reactors are covered with vegetation supported on racks, and are aerated with fine bubble diffusers that provide the oxygen required for treatment and to keep the tank contents mixed. The roots of the vegetation — low-maintenance, hardy plants that produce long, dense root systems — provide ideal surfaces for the growth of attached microbial populations.

The vegetation serves as habitat for beneficial insects and organisms that graze on microbial biomass. This grazing reduces the sludge volume and maintains the microbes at optimal growth rates, resulting in less solids discharge to the municipal sewer. This presence of more diverse and complex life forms provides an additional degree of efficiency, resiliency, and resistance to process upsets. Also, the vegetation and racks decrease the surface turbulence in the reactor, which reduces the formation of aerosols and volatilization of odor compounds.

A layer of lightweight, expanded shale aggregate atop the racks creates a natural biofilter colonized with bacteria that remove any residual odor compounds. A ventilation system with activated carbon scrubbers provides a multiple barrier for odor control within the indoor hydroponic reactors. Direct access to the wastewater is only through secure hatches.

To optimize total treatment volume and accommodate shallow bedrock on the upper site, additional hydroponic reactors on the lower portion of the site blend seamlessly with the demonstration tidal wetland cells and feature native and naturalized plant species.

While a significant portion of the suspended solids is consumed in the hydroponic reactors, remaining solids and dissolved phosphorus must be removed. The solids are passively settled in the quiescent clarifier tank, which removes solids to less than 10 mg/l. A portion is pumped back to the beginning of the treatment process to provide ample bacterial communities for the treatment process, and a small amount is discharged to the municipal sewer.

A disc filter located between the glasshouse and MBBR tanks removes any remaining suspended solids and delivers a highly transparent effluent to the downstream UV disinfection system, which inactivates any remaining microorganisms. To maintain a disinfection residual in the water reuse piping back to the cooling towers and other reuse applications, a small amount of chlorine is added. Online instrumentation verifies turbidity and UV transmissivity. The entire process requires approximately 12 hours from extraction to distribution.

Once treated, the reclaimed water is reused as process make-up at four of the six central utility plants on Emory’s campus, and plans are under way for extension and expansion. Additional uses for
reclaimed water will include toilet flushing at select residence halls and irrigation at major athletic fields in the future. Recycled water is currently distributed across the campus via a comprehensive distribution and controls system that fully integrates with the existing campus framework and enables the demand-based delivery system to be actively and proactively managed and optimized.

By utilizing a natural treatment approach, the WaterHub has significantly reduced energy demands compared with other biological or membrane treatment systems. Natural systems exhibit an intrinsic ability to diffuse oxygen into the systems. This helps reduce the energy required for aeration, which is typically one of the most significant energy and cost factors in a wastewater plant. These efficiencies are also complemented by solar energy production via two large photovoltaic panels located on either side of the treatment plant.

Innovative project financing
Using a model similar to a Power Purchase Agreement, the turnkey WaterHub reclamation system was built through a financing vehicle called a Water Purchase Agreement (WPA). The project was designed, built, and operated by a private special purpose entity which bore all project development costs. The university’s only commitments are a long-term ground lease and commitment to buy the produced water at agreed-upon rates. These rates are guaranteed to remain below the prevailing local water and sewer rates, resulting in guaranteed savings from the first day of operation. All compliance and operational risks and costs, as well as predictive and preventative maintenance requirements, are also absorbed by the project company under the WPA.

A more resilient campus
By providing an alternative source of water for critical heating and cooling, the campus now has N+1 redundancy for a large portion of its water demand. With the addition of a 50,000-gallon clean water storage tank, the campus has a tertiary level of redundancy that allows the campus heating and cooling to safely operate for an average of seven hours, depending on seasonal operating demands, in the case of a disruption in water availability.

After only three months of operation, this redundant water supply system was put to the test when a 48-inch potable water main ruptured only a few miles from campus. Pressure losses affected nearby hospitals, as well as the university’s neighbor, the Centers for Disease Control (CDC). While the CDC was forced to close its doors, the university’s utility operations served by reclaimed water were largely unaffected, and the campus remained open.

Localizing water supply through onsite reuse provides greater control over supply, water quality, and long-term costs. Overall, the WaterHub
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DANIEL ALLISON is an environmental planner with Richmond, Va.-based Sustainable Water LLC, a developer of commercial-scale water reclamation projects across the U.S. Sustainable Water's mission is to change the paradigm associated with water management, which enables a more resilient, sustainable future for generations to come.

Emory is one of many bulk water consumers in need of a higher level of resiliency in the face of water scarcity and other looming water management risks. Douglas Hooker, director of the Atlanta Regional Commission, reiterated this point as he spoke to a crowd of a few hundred people during the WaterHub's commencement ceremony in April 2015, saying, “This WaterHub will shine as a model for other universities, other governments, and commercial campuses to replicate. The benefits of this project are not theoretical or abstract; they’re very real, very measurable, and they’re very immediate, leaving no doubt of the direct beneficial impact that sustainable practices can have on our water systems.”

The facility has attracted the attention of universities, engineers, and water management professionals around the country. EPA Administrator Gina McCarthy requested a private tour of the facility prior to it being fully operational. Impressed with the system, McCarthy tweeted that the WaterHub is “a model for us all.”

In addition to being named WRA’s 2015 Innovative Project of the Year, the WaterHub at Emory University has received an Atlanta E3 Award (Liquid Assets category) from the Metro Atlanta Chamber, the Construction Management Association of America’s Project Achievement Award (Infrastructure Private Sector category), the Superior Environmental Performance Award from the Georgia Safety, Health and Environmental Conference and the Georgia Chapter of the American Society of Safety Engineers, and a Grand Award for Engineering Excellence from the American Council of Engineering Companies of North Carolina.

More than 250 people — including representatives of sustainability groups, congressional offices, regional university and local institutions — attended a ribbon-cutting ceremony in April 2015 for the WaterHub at Emory. Photo: courtesy of Sustainable Water
Hydraulic equipment in two civil engineering labs recently pushed and pulled at test sections of a new kind of wind turbine tower, simulating the heavy, twisting loads that towers have to withstand. In Iowa State University’s Structural Engineering Research Laboratory, an actuator rocked a 12-foot-high and 6.5-foot-wide test section with 100,000 pounds of force every 1.25 seconds. The test section’s two panels and two columns only moved a tenth of an inch, but the movement was visible — especially the swaying of the long wires attached to 65 strain and displacement sensors.

Those sensors collected data 50 times every second over weeks of fatigue testing. Meanwhile, Hartanto Wibowo, Ph.D., an Iowa State postdoctoral research associate, was on the lookout for tiny cracks or any other signs of wear in the test section, particularly around the prestressing cables connecting the panels and columns.

An experiment at the University of Minnesota’s MAST Laboratory tested operational and extreme wind turbine tower loads on a full-scale cross section of a tower — an assembly that was 16 feet 7 inches high, 8 feet in diameter, and included six panels and six columns tied together with prestressing cables. Engineers collected data to see if the assembled tower pieces would hold up under the loads and whether they would transfer the load from piece to piece and act as a single unit.

The fatigue test is ongoing with no damage detected after nearly 200,000 load cycles.

“It’s fair to say these tests were a success,” Sritharan said. “I think we’ve made great progress in validating a new concept of using prefabricated concrete for taller wind turbine towers.”

The test sections aren’t anything like the 80-meter steel wind turbine towers you see all over the Iowa countryside. They’re easily transportable precast columns and panels made from high-strength or ultra-high-performance concrete. Those columns and panels are tied together by cables to form hexagon-shaped cells that can be stacked vertically to form towers as tall as 140 meters.

Iowa State University engineers call this taller tower technology “Hexcrete” and think it could revolutionize the production of wind energy. Sritharan said taller Hexcrete towers have many advantages over today’s steel towers:

- The precast concrete pieces can be easily transported and assembled on site.
- The technology engages precast concrete companies — an established American industry — in the wind energy business.
- Concrete towers can reach beyond 80 meters, providing access to the faster and steadier winds at 100 meters and higher.
The Goldman Sachs Group, Inc. announced that it will expand its clean energy target to $150 billion in financings and investments by 2025 as part of its updated Environmental Policy Framework. First established in November 2005, the new framework codifies the roadmap for continued environmental progress across each of Goldman Sachs’ businesses.

“Over the past 10 years, we have built on our commitment to harness market-based solutions to help support a healthy environment and address the problem of climate change. We will continue to work towards deploying innovative financial mechanisms through an expanded investor base focused on environmental opportunities,” said Lloyd Blankfein, Goldman Sachs chairman and CEO.

The updated Environmental Policy Framework includes expanded targets and key initiatives that will guide Goldman Sachs’ ongoing contributions to a sustainable future. Some highlights include:

- By 2025, Goldman Sachs will target $150 billion in clean energy financing and investments, expanding the existing $40 billion target set in 2012.
- By 2015, Goldman Sachs will be the first U.S. investment bank to be carbon neutral across its operations and business travel. By 2020, the firm will target $2 billion in green operational investments and seek to source 100 percent renewable power for its global electricity needs.
- Goldman Sachs will target deployment of clean energy solutions to underserved markets to facilitate more equitable and affordable access through the launch of a Clean Energy Access Initiative.
- The Goldman Sachs Center for Environmental Markets will invest $10 million in grants through partnerships that will demonstrate the potential of innovative financial mechanisms to unlock capital for environmental solutions.

The framework also includes initiatives to facilitate capital for water, climate risk solutions, and other environmental opportunities, and to develop innovative applications for green bonds, as well as its approach to environmental and social risk management. In addition, Goldman Sachs Asset Management will expand its Environmental, Social and Governance and impact investing capabilities.

“Environmental issues have become increasingly relevant to our clients and our investors, and have become core to our business,” said Kyung-Ah Park, head of Goldman Sachs Environmental Markets. “We are leveraging the talents of our people and the breadth of our businesses to facilitate the transition to a low-carbon future and promote sustainable economic growth.”

Information provided by Goldman Sachs (www.goldmansachs.com).

GOLDMAN SACHS EXPANDS FOCUS ON CLEAN ENERGY

NEW ENVIRONMENTAL POLICY FRAMEWORK SETS $150 BILLION INVESTMENT TARGET BY 2025.

Watch a video rendering of Hexcrete cells being assembled into taller wind turbine towers at https://www.youtube.com/watch?v=XizC5spy3mg.

Taller towers allow wind energy harvesting in regions of the country where energy demand is high and favorable winds are only above 100 meters.

Hexcrete helps reduce the cost of wind energy by cutting the production and transportation costs of towers.

Current research and development of the Hexcrete towers is supported by an 18-month, $1 million grant from the U.S. Department of Energy, a grant of $83,500 from the Iowa Energy Center, and $22,500 of in-kind contributions from Lafarge North America Inc. of Calgary, Alberta, Canada. The project’s industry partners also include Siemens Corp.’s Corporate Technology center in Princeton, N.J.; Coreslab Structures (OMAHA) Inc. of Bellevue, Neb.; and BergerABAM of Federal Way, Wash.

Sritharan’s Iowa State research team also includes Julienne Krennrich, Ph.D., project manager and assistant director of the Engineering Research Institute; Shbin Lin, Ph.D., a postdoctoral research associate; plus Bin Cai and Robert Peggar, doctoral students.

“Now our goal is to build a full tower in the field,” Sritharan said. “Our intent is to identify partners who can work with us on a prototype tower. We’ll also work to develop a commercialization plan.”

To advance those efforts, Sritharan’s research group will host technical and commercialization workshops next year.

The updated Environmental Policy Framework and related content, including the 10-year milestones, are available on the Environmental Stewardship section of the Goldman Sachs website at www.goldmansachs.com/citizenship/environmental-stewardship/index.html.

Information provided by Iowa State University (www.iastate.edu).
SUCCESSFULLY VEGETATING A JOBSITE

FOCUS ON THE SOIL FIRST AND REVEGETATION AND EROSION CONTROL WILL FOLLOW.

By Lauren Alaniz

VEGETATION SUCCESS is an imperative part of closing out construction projects and ensuring that jobsites transition into long-term successful sites. Installing degradable erosion control blankets or spraying a hydraulic erosion control product protects the site from erosion and failure in the short term, but those products are designed eventually to degrade to nothing and the vegetation (or lack thereof) will be the only long-term erosion control on the site.

Are we comfortable with that? Are we successful enough at vegetating to ensure that erosion control needs are being met? We are far from the only industry that gets paid to grow plants, so why are construction industry success rates so far behind the other industries?

There are two common ways to grow plants: one is with an emphasis on short-term goals — forced growth followed by harvest and replanting — and the other with an emphasis on the longevity of the plants themselves. Obviously, the former is utilized by agriculture and the latter by commercial growers, golf courses, forestry services, etc. What is surprising is that currently the construction industry is mirroring the techniques used in agriculture instead of techniques focused on long-term results. We are not harvesting highway medians, and surely we don’t want to be replanting them yearly, so, our focus should be on adjusting designs and installations to ensure better results.

The difference between the two techniques is the emphasis on providing for the systems in the soil that plants depend on for longevity and self sustainability; looking at the way nature revegetates and mimicking that on an increased timescale. This is a closed-circle system of healthy plants, then those healthy plants drop leaf litter, mycorrhizae and bacteria break down leaf litter and organic matter into nutrients and transport them back to the plants, and then those nutrients are utilized by the plants.

This emphasis on soil and a healthy colony of soil organisms results in plants that are often twice as vigorous and much more disease resistant. It is the piece that the construction industry has been missing thus far with its almost exclusive emphasis on top growth. Truly, it is the growth underground that we cannot see that matters. Just as we would never think to build a bridge without a proper footing, so too we must focus on the soil before trying to grow vegetation successfully.

The steps involved in ensuring this proper footing for vegetation are simple. We need to focus on sufficient pore space, organic matter, and thriving soil mycorrhizae and bacterial colonies. That’s it — not copious water, not constant fertilizing, not significant maintenance efforts. Nature does not have those things, proving they are not always required for successful vegetation on construction sites. Our efforts need to be focused on soil first and the desired results will follow after.

Pore space — Pore space — the distance between soil particles — is the easiest to incorporate on construction sites; it literally is nothing. Plants need this open area for air exchange, water infiltration, and proper root expansion and growth. The easiest way to achieve adequate pore space is to focus on less compaction or by tilling or scarifying the surfaces of the areas we want to plant. Increasing the soil pore spaces has the added benefit of decreasing the amount of stormwater runoff from sites.
Organic matter — The next component we need to incorporate is organic matter. Without significant amounts of organic matter, growing plants is not possible for the long term without intense maintenance efforts. An example of this is hydroponics: You can grow plants without soil and organic matter, but the tradeoff is a human hand being responsible for all of the plants’ needs. We want to be hands off as much as possible in maintenance requirements.

There are numerous methods of adding organic matter back to construction sites such as importing topsoil or compost or adding a Biotic Soil Amendment (BSA). Topsoil is generally only 5 percent organic matter, 45 percent pore space, and 50 percent mineral — basically the same material as the subsoil. (Boundless, “Soil Composition,” Boundless Biology, July 3, 2014) Adding topsoil involves substantial and time-consuming effort to incorporate the small amount of its organic matter that is lacking. Compost is another option, but has issues of its own with quality control and percentages of undesired material (plastics, etc.) being introduced onto the site.

BSA materials add the desired organic matter to the existing soil, turning it into a viable growing medium for plants. This technique is also significantly faster and less expensive than the other two alternatives.

Soil mycorrhizae and beneficial bacterial colonies — The next component is also the most overlooked: a focus on incorporating beneficial soil mycorrhiza and bacteria. Considering that 90 to 96 percent of plants are dependent on soil mycorrhizae (Jeff Lowenfels, 2013, Teaming with Nutrients) it’s amazing that this is not more recognized in the industry as a necessity. These soil mycorrhizae, or symbiotic fungi, form a relationship with plant root systems that drastically increase their nutrient absorption capacities. Mycorrhizae also have the added benefit of increasing plants’ resistance to disease.

Beneficial soil bacteria also play an important role in plants’ long-term success. They are responsible for breaking down the leaf litter and organic material into nutrients that the plants can utilize for growth as well as for nitrogen fixing in the soil. If we do not always want to be fertilizing sites with chemical fertilizers (and maintenance budgets and the water quality of our lakes and oceans say we do not) then having enough nitrogen-fixing bacteria working for us in the soil is a necessity.

The lesson here is simple: Erosion control is not our objective; revegetation is our objective and erosion control is the result of successfully achieving it. The steps to that long-term success come by focusing on the soil itself. By incorporating the needed pore space, organic matter, mycorrhizae, and beneficial bacteria on construction sites, the long-term success of revegetation plans can become a reality. By understanding that the need to close out construction sites can be achieved through meeting the soil requirement needs of the vegetation, you will become Mother Nature in a hardhat!

LAUREN ALANIZ, Western U.S. regional sales manager for ECB Verdyol (www.bioticearth.com), has worked in the horticulture and erosion control industry for the last 16 years, providing engineering presentations and working with distribution partners to solve difficult erosion issues.
ROOFS CAN BE simple or complex, and many designers find them difficult to model in Autodesk Revit. The following tips can help you understand exactly how to achieve the look you are after — no matter how complex a roof you create.

First, it is important to understand that Revit roofs are “system families,” like walls, ceilings, and floors. Any roof you create exists inside the Revit project and is not a separate component or element like other Revit family (.rfa) files. This means that you cannot save a roof or roof system out to a library like a door or a desk. To import a roof type from one project to another, use the “Transfer Project Standards” command, or just copy and paste.

Second, creating a roof in Revit is similar to creating floors or ceilings using a sketch-based method. Roof “types” are also the same as “types” in floors and ceilings. You can change roof types on the fly using the type selector. This is true whether it is a basic, single-element slab roof or a complex roofing system made up of specific material assemblies.

Out-of-the-box, Revit provides three ways to create roofs:
- Roof by Footprint
- Roof by Extrusion
- Roof by Face

Roofs by Footprint
Using the Roof by Footprint method, create the roof by sketching a 2D outline of the roof’s exterior shape in plan view. Define the slopes by picking the lines in the footprint that define the edges of the roof planes. The sketch of the roof must be a closed loop, though you can include other closed loops inside the sketch, which will become openings. The plan level where you start the sketch determines the roof level.
Flat roof — This simple roof is made using the Roof by Footprint method with no defined slopes on any of the sides.

Skillion roof — Select overhang length on all sides and define the slope.

Gable roof — Select overhang length on all sides and define the slope on two sides (see Figure 1).

Dutch gable roof — A Dutch gable roof is usually a four-sided roof made up of a lower hip roof and an upper gable roof. Create this roof by drawing two roofs and placing them on top of each other using the following steps (see Figure 2):

1. Start by creating the lower hip portion of the roof using Roof by Footprint.
2. Once you have created the hip portion, and you are still in the sketch mode, draw another rectangle inside the roof to create an opening.
3. Now create the upper gable portion of the roof using Roof by Footprint and the “Pick Line” tool to select the opening in the hip roof as the outline of the gable roof.
4. When both parts of the roof are ready, make a section view so you can move the upper portion to align with the lower portion of the roof.
5. Once the two are aligned, use the “Join Geometry” tool to remove the line between the two parts.
6. To finish, add two walls to fill in the hole in the open gables ends, then attach them to the roof to correct the wall profile.

Cone glazed roof — Create this roof using the Roof by Footprint method, with the “Sloped Glazing” roof type, using the following steps:

1. Begin by creating the Roof by Footprint using the Sloped Glaze type.
2. In the Type Properties for Sloped Glazing, make sure the Layout is set to “Fixed number” for both Grid 1 and Grid 2.
3. The Grid 1 number will be one half the number of glazed panels (it accounts for one half of the circle of the cone, as Revit creates circles in two segments). In this example, the number is 12, which equals a cone made of 24 segments in each “ring.”
4. Grid 2 is the number of “rings” the cone is made of. There will be one more row of glazing panels than there are rings. In this example, the number of “rings” is 4, which means 5 rows of panels.
5. One last thing to ensure that the roof works: It must have a defined slope, even if it’s only 0.5 degree. In this example the slope is 30 degrees (Figure 3).

Roofs by Extrusion
Create Roofs by Extrusion by sketching a profile of the top of the roof in an elevation, section, or 3D view, then extrude the roof. Set the start and endpoint to determine the extrusion depth. The roof type sets the thickness of the structure. Create the profile using a combination of straight lines and arcs. The location of the profile in the elevation determines the height of the roof.
**Gambrel or barn roof** — The easiest way to create this roof is using the Roof by Extrusion method (see Figure 4).

**Saltbox roof** — This roof is similar to a gable roof, but the slope and length of the two sides of the roof are not the same (see Figure 5). This results in a steeper, shorter front and a longer, shallower slope for the back. These roofs are typically on saltbox houses that have two stories in the front and one in the back.

**Roofs by Face**
The Roof by Face tool lets you create roofs on any non-vertical faces of a mass. Use this tool when creating a roof from an in-place mass or a mass family you have loaded into your project. These roofs are more complex and integrate into the overall building geometry. Be aware that roofs created using the roof by face tool do not automatically update if you change the mass face.

**Dome roof** — Create dome roofs using roof by face, with an out-of-the-box “Dome” mass family:

1. Begin by loading the Dome mass family into your project. Choose either the metric or imperial library based on your project needs.
2. Once the dome mass is in place, make sure it is on the correct level and that the size of the dome is not too “steep” to be converted to a roof. If it is too steep, Revit will let you know with a warning that says, “Can’t make roof.”
3. You can adjust the size of the mass with either the “pulls” in a view, or by selecting the mass and adjusting the radius and/or height in the properties dialog box (see Figure 6).
4. Now the mass is set up to then start the Roof by Face command to create the roof.
5. Choose roof type from the type selector, then select both parts of the dome mass and choose “Create Roof” from the contextual tab.
6. Now that the roof exists, it occupies the same space as the dome mass. Select both using a filter so that you can turn off the mass. You could also delete the mass at this point, but if there is any editing to the roof later, it is much easier to do using the original mass.
7. Now that the mass is off and the roof visible, you will see a couple of issues. First, the default roof rafter cut is “Plumb Cut,” and if you look at the roof in section you will see that this could be detailed better as the “Two Cut – Square” option. The Rafter Cut options are available in the properties dialog box once you have selected the roof.
8. The next issue is the line in the middle of the dome, even when you turn on Realistic Mode. Fix this by going into the Graphic Display Options, in the Visual Style area and uncheck the “Show Edges” option.

Rooflines can make or break projects. They are, after all, a building’s crowning glory. Getting roofs right in Revit takes a little time and effort, but the results are worth it.

**CARL STORMS** is senior applications expert - Building Solutions, IMAGINiT Technologies. **HEATHER ALLEY, R.A.** is applications expert, IMAGINiT Technologies.
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Transportation

Bridge design firm Finley Engineering Group (FINLEY) won two 2015 ASBI Bridge Excellence awards from the American Segmental Bridge Institute (ASBI). Additionally, two projects were finalists in the Bentley 2015 Be Inspired Awards competition.

The award-winning ASBI projects for Innovation in Design and/or Construction were Section 5 Palmetto SR826/836 Interchange (Bridges 9, 11, 15 and 19) in Miami, and the U.S. 281 Bridge over the Colorado River in Marble Falls, Texas. The two FINLEY projects ranked as Bentley Be Inspired awards finalist were the I-49 Segment K in Caddo Parish, La., and the U.S. 281 Bridge over the Colorado River.

**Section 5 Palmetto SR826/836 Interchange**

For the Section 5 Palmetto SR826/836 Interchange (Bridges 9, 11, 15 and 19), as the engineer of record and as part of the design-build team, FINLEY designed and provided the construction engineering on four high-level segmental bridge ramps that traverse the core of the interchange. The segmental bridge ramps were precast, balanced cantilever and erected with a 460-foot launching gantry. The bridge lengths vary from 1,100 feet to 2,450 feet and are 47 feet wide, with a maximum span length of 266 feet. The curved segmental bridge ramps are the third level of the interchange with radii down to 590 feet and have a maximum superstructure deck height of 95 feet above the proposed ground. All of the bridges are supported on 24-inch pile foundations and reinforced concrete piers and caps.

The design offered unique challenges integrating underlying roadways, canals, and maintenance-of-traffic requirements into the layout of these segmental bridge ramps. This project was constructed in the Miami International Airport flight path and had FAA requirements. The high-level segmental flyovers are built over multiple roads that carry 430,000 vehicles per day and are the tightest elevation curves erected in the United States. The all-overhead erection eliminated the need for falsework and cranes and eliminated five maintenance-of-traffic phases that would have impacted traffic, thereby providing a safer work environment.
FINLEY integrated the design into the construction while satisfying the strong aesthetic requirements. The design reduced maintenance and construction costs with the utilization of external tendons, diabolos and deviators. The use of polystyrene in the hollow pier columns, except at the base of the caps, eliminated the need for interior formwork and reduced the overall mass of the structure and concrete required.

An ASBI awards juror said, “Great solution in a difficult environment. Proportioning pier caps to accept temporary jacks for cantilever stability during construction was an innovative way of eliminating temporary stability towers, reducing impacts to the motoring public. Rapid construction completed with significant cost savings proves once again, segmental bridge is a competitive structure type. First use of diabolos in Florida was proven successful.”

Key team members on the project were the Florida Department of Transportation (owner); Community, Condotte America, Inc., De Moya Joint Venture (contractor); FINLEY (segmental bridge design); BCC Engineering, Inc. (prime design consultant); Touchstone Architects (bridge aesthetics); Rizzani de Eccher (precast producer); DEAL (casting and erection equipment); VSL (post-tensioning); and AIM Engineering and Survey, Inc. (construction engineering and inspection).

**U.S. 281 Bridge**

For the U.S. 281 Bridge over the Colorado River, the FINLEY-Archer Western Contractors Team’s proposed design modifications and proposed means and methods met all project requirements, including a signature bridge that was more efficient to build and saved $2 million, 5 percent below the Texas Department of Transportation’s (TxDOT) estimate.

A major change to the design was the modified pier table and segment lengths. Because the river bed and adjoining cliffs are hard limestone and the adjoining Lake Marble Falls is a major tourist attraction, TxDOT wanted the bridge to have the fewest piers necessary in the water. FINLEY’s approach reduced the pier table length by 40 percent, saving approximately 12 weeks off the construction schedule. The design modifications included the use of the contractor’s form travelers from another jobsite and available for this project. This provided a cost savings of $750,000.

The cast-in-place segmental construction method used form travelers,
which required less labor-intensive falsework to be built to support
the bridge during construction and reduced several months off the
project schedule. Traditional cofferdams could not be used. The
design modification specified a hanging precast concrete footing
form from the drilled shaft casings. The “bathtub” style form was
precast onsite and then lowered into the water with wall forms
already attached, providing for a dry work environment to construct
the footing. The bathtub dewatering design allowed the entire column
pour in dry conditions.

Use of FINLEY’s proprietary software made it possible to develop
details quickly to meet the demanding schedule, including integrated
segment drawings combining reinforcing bars, bolt inserts (for
utilities), electrical conduits, etc., all into one drawing. The design
modifications and proposed means and methods met all project goals
and provided a signature bridge, while saving time and money.

An awards juror said, “Reused form travelers from another project
resulted in cost and time savings. Highly aesthetic shape in an area
with heavy recreational boat traffic. Innovative precast footing
box allowed for footings to be placed below the waterline without
cofferdams. The perfect fit to meet this project’s diverse demands of
the traveling public, local environment, and surrounding community.
The boat-shaped hull bottom slab, tapered piers, absence of visible
foundations, and lighting have combined to produce a beautiful
bridge day or night.”

Key project team members were the Texas Department of
Transportation (owner, bridge designer); Archer Western Contractors
contractor); FINLEY (alternative superstructure design and
construction engineering); and VSL (post-tensioning).

I-49 North Segment K
The I-49 North Segment K extension is part of a 30-mile-long project
by the Louisiana Department of Transportation and Development.
It includes roadway improvements and service roads on the I-49
Bridge. FINLEY provided bridge design services for three precast
segmental bridges with 120- to 260-foot span lengths. This included
700 segments and roadway cross sections from 31.5 to 52 feet.

To streamline precast segment production, FINLEY developed
a single segment core that could accommodate the variation in
segment widths. The cross sections for three bridges had to be
developed concurrently to meet this challenge and optimize segment
casting for the entire project. Using the cross-section/post-tensioning
generation capabilities of RM Bridge, FINLEY was able to perform
the superstructure design of three bridges simultaneously.

Key project team members were the Louisiana Department of
Transportation and Development (owner); FINLEY (segmental bridge
design engineer of record); TRC Engineers (prime consultant bridge
design steel box girder bridges); Touchstone Architects (interchange
bridge aesthetics); AFJM, Inc. (prime roadway design consultant);
and NTB Associates (roadway consultant I-220 bridge widening).

Information provided by Finley Engineering Group (www.finleyengineeringgroup.com).
A UNIVERSITY OF Southern California (USC) study of the Los Angeles Expo Line has finally proven what transportation planners have long theorized about urban rail projects: even the most effective ones are unlikely to reduce traffic congestion. That runs counter to the way many rail projects have been marketed to the public, a strategy the study’s authors say overlooks more valid reasons for supporting transit infrastructure.

Their findings are also the first to come from a unique big data archive run by USC, one of the largest in the country looking at urban transportation. The archive hints at a future in which smart cities could measure service performance with scientific detail. That would help transportation agencies make better policy decisions and decide which taxpayer-funded projects are worth investing in.

The study, published in the Journal of Planning Education and Research, was authored by Genevieve Giuliano, Ferraro Chair in Effective Local Government at the USC Sol Price School of Public Policy; Sandip Chakrabarti, a post-doctoral researcher at METRANS Transportation Center, a joint research partnership between USC and California State University, Long Beach; and Mohja Rhoads of South Bay Cities council of Governments.

The findings
For the last four years, Giuliano’s team has worked with Cyrus Shahabi and Ugur Demiryurek of the USC Viterbi School of Engineering to establish a big data archive — the Archived Data Management System (ADMS). Partnering with Los Angeles County Metro has made the data store vast and diverse, including four years of readings from traffic sensors, bus passenger counters, and accident reports.

The uncompressed archive totals about 15 terabytes, according to Demiryurek, associate director of the Viterbi School’s Integrated Media Systems Center, who built much of the ADMS archive and its algorithms.

The study data was pulled from geo-located sensors along the I-10 Freeway and arterial roads over a three-month period, checking readings at 30-second to 1-minute intervals. The team used close to 1 million records from freeway sensors and almost 16 million from arterial road sensors.

These readings revealed that Phase 1 of the Expo Line had little to any impact on local street or freeway congestion. It did, however, initiate a significant overall rise in transit ridership across the Culver City-Downtown LA corridor along the Expo Line.

The findings are in line with the concept of “triple convergence” — the idea that raising overall capacity for a transportation system will only improve congestion in the short term before returning to previous levels (or even growing worse).

“Looking into the future, this study shows us how to be more realistic in what we should expect from transit,” Chakrabarti said. “There is value in creating quality transit for those who use it by choice or by need. It improves productivity for a lot of people.”

Effective transit projects can expand residential and employment opportunities, he added, while also providing access to services that are critical for lower-income people.

Power of big data
Many transportation studies still require someone standing on a corner to count the number of cars that go by, or survey bus riders on their overall experience, Chakrabarti said. Very few cities across the country are systematically storing real-time data sets like this.

“We’ve never had this level of granularity,” he said. “Many cities are collecting this kind of data, but it’s seldom archived in a systematic fashion. Mostly, it’s used for real-time operations and it goes down the drain.”

Chakrabarti said the ability to do before/after studies opens new possibilities as far as measuring, monitoring, and evaluating the performance of systems and new infrastructure projects.

Another difference is how the data is crunched. Demiryurek said most existing route planning algorithms use real-time data. But the archive learns from past history, effectively making decisions using predictive data, as well.

He said this represents a leap beyond navigation algorithms used by Google Maps and Waze. The USC technology has already been licensed for commercial use by a company planning to compete with both those mapping services.

“If you can understand traffic and predict traffic, you can plan your schedule much better,” Demiryurek said. “Instead of detect and react, the idea is to predict and avoid. Current navigation algorithms are all in the state of detect and react.”

Being able to predict how a particular traffic intersection, bus line, or train stop functions at rush hour, and how it fits into the whole of L.A.’s transit system, could change which policies officials endorse. It could also prove which taxpayer-funded projects are worth investing in.

“The next step is to transition Los Angeles into a smart city,” Demiryurek said. “Right now, we’re talking to people in the city for new projects.”

Information provided by the University of Southern California (www.usc.edu).
The Rueter-Hess Water Purification Facility (RHWPF), located in Parker, Colo., southeast of Denver, celebrated its grand opening in October 2015. The water treatment plant, which serves a community of approximately 50,000 residents, uses new technologies that have enabled the Parker Water and Sanitation District (PWSD) to convert from rapidly declining groundwater sources to a renewable water supply, including surface water, groundwater, alluvial well water, and reclaimed wastewater.

Designed by Dewberry, the RHWPF is the first plant in the world to incorporate a trio of cutting-edge technologies to meet EPA drinking water standards. The process includes three key stages:

1. **Microsand and Recirculated Powdered Activated Carbon**
   The two treatment processes, necessary to remove the organic compounds inherent to raw surface water sources, incorporate microsand and recirculated powdered activated carbon to increase efficiency and reduce space requirements. Photo: courtesy of Dewberry

2. **Ceramic Membrane Filters**
   The Colorado Department of Public Health and Environment provided regulatory approval for the first-time use of ceramic membrane filters for a drinking water system in the U.S. Photo: courtesy of Dewberry

THE RUETER-HESS

Water Purification Facility (RHWPF), located in Parker, Colo., southeast of Denver, celebrated its grand opening in October 2015. The water treatment plant, which serves a community of approximately 50,000 residents, uses new technologies that have enabled the Parker Water and Sanitation District (PWSD) to convert from rapidly declining groundwater sources to a renewable water supply, including surface water, groundwater, alluvial well water, and reclaimed wastewater.

Designed by Dewberry, the RHWPF is the first plant in the world to incorporate a trio of cutting-edge technologies to meet EPA drinking water standards. The process includes three key stages:
• A coagulation, flocculation, and sedimentation chamber uses microsand to enhance particle sedimentation while reducing the chamber’s surface area requirements.
• A recirculating powdered activated carbon (PAC) chamber cuts costs by sending used PAC back through the system, increasing the amount of contact time between PAC particles and dissolved organic compounds for a more aggressive and efficient treatment.
• The treated water is then pumped through ceramic membrane filters to remove remaining particles larger than 0.1 micron in size and any remaining microsand or PAC.

In the first such application in a drinking water system in the United States, the 600 ceramic membrane modules were specifically chosen for their ability to withstand impacts from the abrasive sand and PAC particles used in upstream processes and then be cleaned back to like-new condition. The ceramic membrane filtration system is anticipated to last much longer than conventional polymeric membranes.

“The ceramic membranes are very durable and can withstand impacts from sand and powdered activated carbon, which is very abrasive,” said Alan Pratt, P.E., Dewberry project manager for the design of the RHWPF. “The ceramic membranes can be cleaned back to a new condition, whereas polymeric membranes typically deteriorate over a life of six to 10 years and need to be replaced.”
Completion of the 10 million-gallon-per-day (mgd) RHWPF (expandable to 40 mgd) is part of a visionary, multi-phase plan for the water district, where district leaders had long recognized groundwater as a diminishing resource within the rapidly developing area. The new network features a 50-cubic-foot-per-second pump station that brings surface water from nearby Cherry Creek and Cherry Creek alluvial wells into the 75,000-acre-foot Rueter-Hess Reservoir, completed in 2012. Water stored in the reservoir flows by gravity into the RHWPF.

After moving through the two ballasted sedimentation chambers and the ceramic membrane filters, the disinfected water is pumped into the PWSD’s distribution piping network for use by customers. Wastewater is returned to nearby reclamation facilities and then to Cherry Creek for reuse.

In addition to Dewberry, the project team included Western Summit Constructors, Inc. as the primary contractor, Garney-Weaver for construction management, and Kruger, Inc. for the ballasted sedimentation and ceramic membrane filter technologies.

“The ability for us to turn many different water qualities into a high-quality potable water supply has been made possible only with the combined effort of many different companies coming together,” said PWSD District Manager Ron Redd. “Dewberry, Western Summit, and Kruger have all worked very hard to make this plant a reality.”

Information provided by Dewberry (www.dewberry.com).
Green construction is major U.S. economic driver

The green building sector is outpacing overall construction growth in the United States and accounted for more than 2.3 million American jobs in 2015, according to a U.S. Green Building Council (USGBC) study prepared by Booz Allen Hamilton (see Figure 1). The 2015 Green Building Economic Impact Study found that the green building industry contributes more than $134.3 billion in labor income to working Americans. The study also found that green construction’s growth rate is rapidly outpacing that of conventional construction and will continue to rise.

According to the study, by 2018, green construction will account for more than 3.3 million U.S. jobs — more than one-third of the entire U.S. construction sector — and generate $190.3 billion in labor earnings. The industry’s direct contribution to U.S. Gross Domestic Product (GDP) is also expected to reach $303.5 billion from 2015-2018.

“Green building is playing a massive role in the U.S. construction sector, the clean and efficient energy sector, and the U.S. economy as a whole,” said Rick Fedrizzi, CEO and founding chair, USGBC. “More than 2.3 million U.S. workers are taking home $134 billion annually in large part because of green building programs like LEED. Demand for green building will only continue to grow as individuals, businesses, and institutions continue to prioritize sustainable approaches to the design, construction, and operations of our built environment.”

The USGBC analysis also explores the multifaceted economic contribution of green construction to the U.S. economy and individual U.S. states, quantifying the economic impact of green building and Leadership in Energy and Environmental Design (LEED).

“Our research shows that green building has created millions of jobs and contributed hundreds of billions of dollars to the U.S. economy, with the construction of LEED-certified buildings accounting for about 40 percent of green construction’s overall contribution to GDP in 2015,” said David Erne, a senior associate at Booz Allen. “This industry is certainly on the rise, and aggressive growth in the green building sector is anticipated over the next four years.”

In addition to national jobs, GDP, and labor earnings from green building, the study projects significant growth in green building’s contribution to individual states’ tax contributions and environmental asset indicators at both the national and state levels.

Total state earnings related to LEED building construction projects are estimated to total $8.4 billion by 2018. In Texas alone, almost 1.26 million jobs in the green building sector are projected between 2015 and 2018. As a result, green building will also contribute to significant savings across energy, trash, water, and maintenance costs.

Information provided by the U.S. Green Building Council (www.usgbc.org).
STORMS, FLOODS, DROUGHTS, LANDSLIDES, AND WILDFIRES have affected thousands of individuals, families, businesses, and communities across the United States in recent years — 2012 stands out as particularly devastating. Hurricane Sandy received much attention, but a total of 28 states had federal major disaster declarations that year. Many other disasters, emergencies, fire management situations, and other significant events did not qualify for a Presidential declaration. Unfortunately, the frequency and severity of extreme weather events is expected to increase in years to come.

Smart Growth America, a national expert on land use, development, and transportation as they relate to resilience and economic growth, recently published a document, Building Resilient States: A Framework for Agencies, intended to introduce and integrate land use and transportation issues into states’ conversations about resilience. Disaster preparedness professionals can use it to understand how strategic decisions about land use and transportation can build communities that are more resilient from the ground up.

The recommendations in the Framework were informed by the Governors’ Institute on Community Design, with support from the U.S. Environmental Protection Agency, and the 2014 State Resilience and Economic Growth Summit, which brought together 126 representatives from 26 states to discuss ways to improve resilience.

States have a unique stake in disaster preparedness and recovery. Disasters can cost states billions of dollars, and they are always a crucial player in post-disaster clean up and recovery efforts. Yet the states vary widely in their readiness to face disasters. States could save a lot of time, money, and lives by being better prepared. Rather than focusing solely on disaster recovery, states can and should plan for long-term resilience to natural disasters and adapt to a changing environment.

States can influence this in a number of ways:

- play a significant role in deciding how and where development occurs;
- establish guidelines for local land use plans;
- design, build, and fund critical infrastructure, such as roads, utilities, and water systems;
- fund and approve the siting of hospitals, schools, and state government buildings and facilities;
- set guidelines for construction of state-subsidized housing;
- control conservation funding and oversee environmental remediation;
- provide tools and expertise, such as hazard mapping and long-term planning capacities, to local governments;
- disburse federal resources; and
- build local capacity and commitment to disaster resilience.

These activities represent an enormous opportunity for states to improve their resilience in the face of disaster. Governors can move to ensure that these and other state actions not only carry out their intended purposes (economic development, transportation infrastructure, improved housing, etc.) but also contribute to a state’s overall resilience and long-term economic and social well-being.

Ideally, every state action and program should be assessed through the lens of resilience, and resilience should factor into all government decision-making. This approach is so broad, however, that it can lead to paralysis. In addition, not all state actions have equal importance when it comes to their impact on resiliency. From a practical standpoint, governors and their administrations can make significant advances by focusing on a discrete number of key actions and programmatic areas:

- put someone in charge;
- seek the advice and expertise of partners outside state government;
- integrate future risks into a state Hazard Mitigation Plan and land use policy;
- ensure that state investments do not increase vulnerability;
- develop strategies to address assets that are already in high-risk areas;
- help communities become more resilient; and
- develop a process for monitoring, measuring, and reporting on progress.

The Framework provides governors and their administrations specific advice on how to undertake each of these initial steps, as well as examples of successful implementation of each. Every state can learn from these ideas to bounce back more quickly and emerge stronger from disaster.


Information provided by Smart Growth America (www.smartgrowthamerica.org/resilience).
FIRST CODE IMPROVEMENTS ADOPTED BASED ON NIST JOPLIN TORNADO STUDY

PROTECTING SCHOOLS and their associated high-occupancy buildings from the most violent tornadoes is the goal of the first approved building code changes based on recommendations from the National Institute of Standards and Technology (NIST) technical investigation into the impacts of the deadly tornado that struck Joplin, Mo., on May 22, 2011.

The new changes, approved at a recent meeting of the International Code Council (ICC), apply to the nation’s most tornado-prone regions. Enhanced protection will be required for new school buildings and additions to buildings on existing school campuses, as well as facilities associated with schools where people regularly assemble, such as a gymnasium, theater, or community center. Under the updated codes, storm shelters must be provided that protect all occupants from storms with wind speeds of 250 mph, representing the maximum intensity category EF-5 on the Enhanced Fujita Scale. The area covered by the upgraded codes stretches from northern Texas to central Minnesota and from western Oklahoma to western Pennsylvania. It includes the notorious “Tornado Alley” and “Dixie Alley” regions of the Midwest and southern United States, respectively.

The improved storm shelter requirements will be published in ICC’s 2018 International Building Code (IBC) and 2018 International Existing Building Code (IEBC). These are the state-of-the-art model codes used as the basis for building and fire regulations promulgated and enforced by U.S. state and local jurisdictions.

Based on findings from its Joplin study, NIST developed 16 recommendations for improving how buildings and shelters are designed, constructed, and maintained in tornado-prone regions, along with improving the emergency communications that warn of imminent threat from tornadoes. According to Marc Levitan, leader of the NIST team that conducted the Joplin investigation, the new changes to the IBC and IEBC mark the first milestone of the collaborative effort to implement these recommendations.

“Solid progress is being made working with code developers, state and local officials, U.S. agencies such as the Federal Emergency Management Agency (FEMA) and others toward realizing all of the proposed improvements for tornado protection and resilience in our study,” Levitan said.

Current efforts, he said, include developing:

- more detailed and accurate tornado hazard maps for the United States (to support standards on performance-based, tornado-resilient building designs);
- an improved Fujita scale based on advanced techniques for wind speed estimation;
- draft standards for better selecting buildings to serve as disaster shelters; and
- guidelines for determining the best available tornado refuge areas in existing buildings.

NIST’s Joplin investigation team members also recently provided their expertise and insight to help FEMA improve guidance on public sheltering strategies and practices in its publication, FEMA P-361, Safe Rooms for Tornadoes and Hurricanes: Guidance for Community and Residential Safe Rooms, Third Edition.

Levitan and his colleagues will continue to work with their partners to realize the main goal of the Joplin investigation: nationally accepted standards for building design and construction, public shelters, and emergency communications that can significantly reduce deaths and the steep economic costs of property damage caused by tornadoes.

Information provided by the National Institute of Standards and Technology (www.nist.gov).
01. ANTI-CORROSION LASER CLADDING

Eaton said its new Eatonite anti-corrosion laser cladding, which is certified to meet Joint Industry Protection guidelines by DNV GL, protects cylinders in demanding salt water applications and harsh operating environments. Suitable for offshore deep water oil and gas exploration and production, marine, civil engineering, wave power, and other heavy duty applications, Eatonite anti-corrosion laser cladding can be applied to new cylinders or refurbished applications. The coating can be applied to cylinders of any length.

EATON
WWW.EATON.COM/EATONITE

02. SUBSURFACE UTILITY LOCATOR

Leica Geosystems released the Leica ULTRA underground service locating system. A wide range of transmitter mode frequencies allows operators in segments such as power, water, gas, or telecom to optimize locator performance in any operating condition, Leica said. Clear visualizations of line direction and depth indication are displayed on a large LCD interface. According to the company, users can easily interpret signal displays in all light conditions. Bluetooth enables quick connectivity to transfer data to a GIS data collector.

LEICA GEOSYSTEMS
WWW.LEICA-GEOSYSTEMS.COM/ULTRA

03. NOISE BARRIER

Easi-Set Worldwide’s SoftSound noise barrier wall combines a specialized mineralized wood-chip aggregate using cement as a binder in a specific and exacting manufacturing process. Once installed, SoftSound surpasses other products for sound absorption, durability, strength, and moldability, the company said. In a recent project, Design Concrete Systems, a licensed producer of the product, helped the City of London, Ontario save money on overall project costs by integrating the noise wall with the traditional project walls, resulting in an aesthetically appealing, uniform effect. The project included about 45,000 square feet of SoftSound wall.

EASI-SET WORLDWIDE
WWW.SOFTSOUNDWALL.COM

04. MULTIMODE MOBILE WORKSTATION

Lenovo unveiled its ThinkPad P40 Yoga mobile workstation that can work across four modes — laptop, stand, tent, and tablet. A pen and touchscreen powered by Wacom Active ES technology provides 2,048 levels of pressure sensitivity on a high-resolution (2560 x 1440) IPS display. Powered by an NVIDIA Quadro M500M GPU with 2GB VRAM, the ThinkPad P40 Yoga is certified to run a full range of professional applications. The system also features an Intel 6th Generation Core i7 CPU and up to 16GB of RAM and 512GB SSD storage. Lenovo’s Lift ‘n Lock keyboard with a frame automatically rises around the keys when the Yoga device switches into tablet mode.

LENOVO
WWW.THINKWORKSTATIONS.COM

05. ONLINE PRODUCT DATABASE

Geo-matching.com said it is the world’s largest product database for surveying, navigation, and machine guidance featuring detailed product information for more than 1,070 products in 45 product categories. The website guides users through specifications and allows them to read brochures and case studies, watch product videos, and read other professionals’ reviews. Geo-matching.com recently added 3D Printers to its spectrum of product categories. In addition to general specifications, detailed information is given about operation characteristics, filament and cartridges, and connectivity.

GEOMATCHING.COM
WWW.GEO-MATCHING.COM
06. FAÇADE ACCESS EQUIPMENT GUIDANCE

The American Society of Civil Engineers (ASCE) published Façade Access Equipment: Structural Design, Evaluation, and Testing. The volume provides structural engineering guidance regarding design, evaluation, and testing of permanent anchorages and components that support façade access equipment and full-arrest systems. The book reviews OSHA requirements for permanent, building-supported façade access equipment; defines terms; discusses structural load testing, testing methods, and design requirements; and surveys common types of façade access equipment.

American Society of Civil Engineers
WWW.ASCE.ORG/Templates/Publications-Book-Detail.aspx?id=16708

07. POROUS PAVEMENT

Presto Geosystems’ GEOPAVE porous pavements were used in a Wisconsin nature preserve in pursuit of a LEED Platinum rating. The GEOPAVE system, infilled with highly porous stone, allows water infiltration, and acts as a natural, onsite stormwater retention system, storing stormwater in its aggregate base after rain events and allowing for natural percolation. The GEOPAVE paver structure is made from recycled polymer and is designed specifically to contain aggregate infill. The system’s integrally molded mesh bottom contains the aggregate infill and minimizes aggregate movement under vehicle loading and turning stresses.

Presto Geosystems
WWW.PRESTOGEO.COM

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08. PROTECTIVE CASE FOR MACBOOK

Urban Armor Gear (UAG) expanded its protective line of cases to include the 13-inch MacBook Air and 13-inch MacBook Pro with Retina display. Made with a hard armor shell and impact-absorbing corners, UAG’s cases are engineered to be shock and scratch resistant, and are the first lightweight MacBook cases tested to meet military drop test standards, UAG said. Design features include cooling vents for passive heat dissipation, a rubberized FrogSkin non-slip hand grip, and easy access to ports. A dual-lock screen closure secures the display in the shut position during transport.

09. LARGE-FORMAT PRINTER/SCANNER

HP Inc. unveiled five new HP DesignJet technical printers, including the flagship HP DesignJet T830 Multifunction Printer (MFP). The T830 MFP is half the size of competitive large-format MFPs with the same footprint as the HP DesignJet T730 Printer, and offers a damage-resistant design able to withstand challenging job sites, a built-in scanner, and a front panel that can be extended and operated from a tablet. A 36-inch-wide, integrated scanner enables users to modify, scan, and share plans in the office or on construction sites from a mobile device, and its intuitive touchscreen offers realistic print preview and document cropping.

10. FRP COMPOSITES WEBSITE

V2 Composites, Inc. recently launched a corporate website featuring a refreshed design that provides quick and easy access to information on its high-performance fiber-reinforced polymer (FRP) systems used in structural and composite reinforcement applications. In addition to comprehensive product and system information, the pages also feature an information request form to submit questions and comments. A project section showcases V2’s wide range of capabilities and project experience. The new site is mobile friendly, allowing access to V2 resources from tablets and phones in the field.

11. RUGGED TABLET

Handheld Group launched a 7-inch rugged Android tablet, the ALGIZ RT7. The ALGIZ RT7 runs Android 5.1.1 (Lollipop); meets MIL-STD-810G U.S. military standards for protection against drops, vibrations, and extreme temperatures; and is waterproof and fully sealed against sand and dust. The Algiz RT7 comes standard with LTE data and voice capabilities as well as 802.11 b/g/n WLAN, BT Class 1 and Class 2, and NFC functionality. It also has dual cameras (8-megapixel rear-facing and 2-megapixel front-facing), as well as dual SIM card slots. The unit comes with a built-in accelerometer, gyroscope, and e-compass and a stand-alone u-blox GPS receiver for navigation.

12. WASTEWATER TREATMENT

Purestream Services, LLC’s AVARA vapor recompression system for wastewater treatment consistently provides a clean, distilled quality, water effluent stream, the company said. The process concentrates the waste stream for significant waste volume reduction. AVARA technology has been commercially utilized for more than four years in various onshore oil and gas wastewater operations, including to treat produced and frac water in oil and gas operations for volume reduction, reuse, and discharge. It has met stringent NPDES discharge limitations in a number of applications.
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13. **3D MODELING SOFTWARE**

Trimble released SketchUp 2016. Trimble Connect has been integrated directly into SketchUp Pro, allowing teams to more easily access, reference, share, and collaborate on projects in the cloud. In addition, SketchUp 2016 offers several enhancements to its core modeling tools, streamlined reporting, increased overall usability, and a tighter integration with 3D Warehouse, Trimble’s online platform for sharing and downloading free 3D models and materials. SketchUp 2016 supports a variety of operating systems including OS X El Capitan and Microsoft Windows 10.

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14. **SPT ENERGY MEASUREMENTS**

Pile Dynamics, Inc. recently released a redesigned system for Standard Penetration Test (SPT) hammer calibration. The SPT Analyzer system includes a main unit that processes strain and acceleration measurements obtained during the test itself. The measurements are acquired by attaching a rod section specially instrumented with two strain gage bridges and two Pile Dynamics-brand accelerometers to the SPT drill string. In the newest release, Smart Sensor technology allows the program to “read” the rod instrumentation, so that sensor calibration and rod cross sectional area are input automatically to the SPT Analyzer.

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<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advanced Drainage Systems</td>
<td>ads-pipe.com</td>
<td>5</td>
</tr>
<tr>
<td>AEC Workforce</td>
<td>aecworkforce.com</td>
<td>65</td>
</tr>
<tr>
<td>American Concrete Institute</td>
<td>concrete.org</td>
<td>2</td>
</tr>
<tr>
<td>Bentley Systems, Inc. Webcast</td>
<td>cenews.com/continuingeducation/</td>
<td>35</td>
</tr>
<tr>
<td>Civil + Structural Engineer Rising Stars</td>
<td>zweiggroup.com/risingstarsaward</td>
<td>67</td>
</tr>
<tr>
<td>ClearSpan Fabric Structures</td>
<td>clearspan.com/ADCSE</td>
<td>19</td>
</tr>
<tr>
<td>Construction Specialties</td>
<td>c-sgroup.com</td>
<td>9</td>
</tr>
<tr>
<td>Contech Engineered Solutions, LLC.</td>
<td>conteches.com</td>
<td>68</td>
</tr>
<tr>
<td>Cultec</td>
<td>cultec.com</td>
<td>17</td>
</tr>
<tr>
<td>Fenner &amp; Esler Agency, Inc.</td>
<td>fenner-esler.com</td>
<td>64</td>
</tr>
<tr>
<td>HUESKER Inc</td>
<td>huesker.com</td>
<td>15</td>
</tr>
<tr>
<td>HydroCAD</td>
<td>hydrocad.net</td>
<td>64</td>
</tr>
<tr>
<td>IAPMO</td>
<td>uniform-es.org</td>
<td>12</td>
</tr>
<tr>
<td>IECA</td>
<td>ieca.org/CSE</td>
<td>31</td>
</tr>
<tr>
<td>IES, Inc.</td>
<td>iesweb.com</td>
<td>11</td>
</tr>
<tr>
<td>Integrity Software, Inc.</td>
<td>softwaremetering.com</td>
<td>61</td>
</tr>
<tr>
<td>Legacy Building Solutions Webcast</td>
<td>cenews.com/continuingeducation/</td>
<td>49</td>
</tr>
<tr>
<td>Mitered Drain</td>
<td>mitereddrain.com</td>
<td>19</td>
</tr>
<tr>
<td>Plastic Solutions, Inc.</td>
<td>plastic-solution.com</td>
<td>20</td>
</tr>
<tr>
<td>Simpson Strong-Tie</td>
<td>strongtie.com/rps</td>
<td>7</td>
</tr>
<tr>
<td>The Zweig Letter</td>
<td>thezweigletter.com</td>
<td>61</td>
</tr>
<tr>
<td>Triton Stormwater Solutions</td>
<td>tritons.com</td>
<td>18</td>
</tr>
<tr>
<td>Zweig Group 2016 Seminars</td>
<td>zweiggroup.com/seminars</td>
<td>63</td>
</tr>
<tr>
<td>Zweig Group Survey Participation</td>
<td>zweiggroup.com/survey</td>
<td>29</td>
</tr>
</tbody>
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A NEW LINEUP OF DELL MOBILE WORKSTATIONS

By Bob Drake

AT AUTODESK UNIVERSITY in December 2015, Dell released a new lineup of Dell Precision mobile workstations. According to Dell, the new mobile workstations combine thinner, lighter industrial designs — carbon fiber and aluminum for thinner, lighter, yet durable exteriors — and brilliant displays with the performance of the latest graphics technology from AMD and NVIDIA, new processors, and faster memory and storage.

Dell Precision mobile workstations include the 17 7000 Series (17-inch 7710); 15 7000 Series (15-inch 7510); 15 5000 Series (15-inch 5510); and 15 3000 Series (15-inch 3510), with starting prices ranging from $1,699 to $999, respectively. The 5510 is Dell’s lightest (starting at 3.93 pounds), thinnest (0.45 inch front; 0.66 inch rear), and smallest (14.06 inches by 9.27 inches) workstation ever.

Configuration options include the new 6th Generation Intel Core processors, first Intel Xeon processors for mobile workstations, and future Intel Xeon processors E3-1200 product families. New screen options include the first PremierColor 4k Ultra HD displays with 100 percent minimum Adobe RGB color gamut. Full HD and UHD options on the InfinityEdge display offers a virtually borderless screen to provide a 15.6-inch viewing area.

The new Dell Precision workstations also offer Independent Software Vendor (ISV) certifications for various professional applications and hardware customization to ensure systems are tailored to specific needs. The new mobile workstations will support the latest USB technology, plus Thunderbolt 3, and new M.2 PCIe NVMe storage options for maximum throughput when managing large files.

“Performance and accuracy are essential for Autodesk users working on complex projects in modeling, simulation and visualization. We partnered with Dell to certify and maximize the experience of our applications on the new Dell Precision workstations,” said Dave Ford, director, Strategic Alliances for Autodesk.

Dell said it will be enhancing its portfolio of docks in the near future with the introduction of the Dell Dock and Dell Thunderbolt Dock. These docks will leverage both USB Type C and Thunderbolt connections to provide docking solutions on a wide-range of products now and in the future, the company said.

Information provided by Dell (www.dell.com).
Submit your nominations today for the 2016 Rising Stars in Civil + Structural Engineering Awards!

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