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Looking for a job? Highlight your ability, not your experience.

Very few of us hold jobs that line up directly with our past experiences or what we studied in college. Take TED Resident Jason Shen; he studied biology but later became a product manager at a tech company. In this quick, insightful talk about human potential, Shen shares some new thinking on how job seekers can make themselves more attractive — and why employers should look for ability over credentials. 🔗

Source: www.ted.com

Outside the Box will be a standing column designed to introduce new ideas and concepts from other resources and professions that may help stimulate a new way of thinking about total cost management. The views and opinions expressed are those of the authors and do not necessarily reflect the official policy or position of AACE International.

We invite Source readers to send suggestions on other sources to editor@aacei.org.
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The Top 10 Reasons
To Join AACE International

Ready to advance your career and begin enjoying the advantages that our members enjoy? Whether you are an experienced cost engineer or a student, we have a membership ready for you.

1. Time
Gain access to a wealth of resources that will save you time and money! You’ll stay informed about the complexities of the cost and management profession - plus you’ll have access to discounts on educational programs, publications, and more!

2. Information
Locate thousands of technical papers and publications in the Virtual Library. AACE’s database is keyword searchable for quickly locating appropriate reference articles.

3. Career
Members can post resumes at no additional cost in our Career Center and keep your career on track through information sources such as our annual Salary and Demographic Survey of Project and Cost Professionals.

4. Learning
We offer numerous online learning courses on estimating and project management. The Approved Educational Provider program helps maintain high quality development courses and providers. AACE also holds many seminars throughout the year.

5. Resources
Starting with the TCM Framework and Recommended Practices that are available for free only to members to our bi-monthly publication Cost Engineering featuring articles for cost professionals around the world. Through the AACE International website, the Cost Engineering journal is a great current resource for members and as a member, you gain access to an archive of past issues.

6. Technical Development
Increase your knowledge and expertise by joining one of AACE International’s many technical subcommittees, subcommittees, and Special Interest Groups (SIGs) at no additional cost to members. Discuss industry problems with your peers or help experts develop new and improved techniques and practices for the profession.

7. Networking
By attending a local section or our Annual Conference & Expo for interesting speakers, informational tours, social dinners and much more. The online Membership Directory is an excellent source for a list of contact information on thousands of members. Join one of our many technical subcommittees and participate in the AACE Forums - a great way to tap into the collective wisdom and experience of our world-wide membership.

8. Excellence
Our certification programs are independently accredited by the Council of Engineering & Scientific Specialty Boards. AACE certifications are a recognized credible standard in the cost management field. A recent study shows that individuals with an AACE Certification earn 17.4% more than their counterpart without a certificate.

9. Discounts
On products and services ranging from AACE International Conference & Expo registration fees, archived webinars and presentations, certification examination registrations, and more!

10. You!
We are your professional partner bringing you information and support you can trust. Join and become part of a unique network of individuals who are dedicated to improving the cost and management profession.

JOIN TODAY! web.aacei.org
Hi there, I’m Alexia. I joined AACE International at the behest of my boss, David Chick, in 1994. I was straight out of grad school, and an estimator at Technip (then KTI Corporation). I became certified in 1998, on the advice of Deloitte Managing Partner Nicholas Florio; the department encouraged everyone to be certified in something, and the AACE International CCE (now CCP) was the most relevant in my area of expertise.

Two things have remained a constant during my time as a member. First is the dedication, knowledge, and resiliency of volunteers at all levels, local section through executive board, who are the backbone and lifeblood of our Association. Second is the quality and initiative of headquarters staff, who keep things running smoothly. Thank you all for your contributions to AACE International. In this past 25 years, there have also been changes; strong international growth, increasing sophistication of regional and section events, and investment in online communities. There will continue to be changes, and we will do our best to respond accordingly as we see trends and demand.

Even though AACE International has some of the best technical, education, and certification products in the project controls arena, we cannot rest on our laurels if we wish to remain relevant in this space. I have a personal passion for education, and I am very excited about the enthusiasm and energy of our new Marketing Associate Board. The Membership Associate Board, likewise, has great potential and drive. These are my primary areas of focus for the next year, along with appropriate oversight of headquarters and budget, and constant critical questioning. By challenging the status quo, improving our processes, and being responsive to member input and inquiry, we will ensure the AACE International of the future as the best it can be for members and the profession-at-large alike.

Remember, you get more out of your membership in AACE International by being active and engaged. With over 500 local and regional events, and many volunteer opportunities at sections and on associate boards, you have ample occasion to do so. Help us to capture and advance global knowledge and best practices for current and future generations.

I am here to serve you and the profession. I am honored to be your President of AACE International for 2018-2019.

If you would like to contact our current president with questions or comments about The President’s Message please address your e-mail to president@aacei.org. To engage in other discussions, check out AACE International’s Online Forums at www.aacei.org/forums.
Forecasting Based on Time-Scaled Productivity

BY KURT W. WINKEL, CEP PSP

Using time-scaled productivity can be a practical approach for forecasting the outcome of a labor-based effort. An advantage of this approach is that progress does not necessarily have to be gathered in equal duration slices of time, such as weekly or monthly. Rather, it’s more important to have a sampling that is sprinkled over a span of physical gain, say six readings from 10% to 40%.

This method is only applicable when the subject work isn’t overly impacted by extenuating conditions, such as irregular use of over-time, unusual amounts of craft turnover, material shortages, and extreme weather conditions. In other words, events that can influence productivity but are not related to the Forming–Storming–Norming–Performing (FSNP) model of group development. The reason is that such conditions do not occur regularly over time and may not adjust in a manner that is consistent with the calibration curve.

The work must be distinct, not a compilation, rollup, or summary of many identifiably unique scopes; different craft, areas or start/finishes. An example of discrete would be a project titled, Large Bore Pipe in the North-South Rack. Grouping other project piping work with it would likely result in multiple FSNP developments and skew the course of the actual productivity curve. Furthermore, the workhours being captured are to be only those that directly result in units of production being installed or completed. Hours related to support activities such as scaffolding, inspection, and testing should be excluded.

It’s not uncommon for the actual productivity to be somewhat erratic up through the 25% to 30% physical progress; normalization time frame. This is attributed to struggles that come along with crewing up and the initial streamlining of the production process which includes becoming familiar with the work site, staging of materials, and establishing project specific safe work practices. Beyond that, the production period productivity should trace the same approximate general slope and shape of the calibration/plan curve. When this occurs, the cumulative forecast can be derived by extrapolating from the cumulative actual using the calibration curve trajectory to arrive at an Estimate at Completion (EAC) rate.

Figure 1 depicts a work scope that on average is expected to require 500 workhours to complete 1% of the work. As can happen during normalization, the period productivity is initially inconsistent, but then settles into a relatively even pattern. The trend is below the plan/calibration line and hence is being completed at a productivity rate better than planned. From the termination of the historical cumulative line, 50% Physical Progress, the cumulative forecast line is drawn out to 100%, resulting in the EAC rate.

This approach should not be employed until sufficient period productivity measurements have been gathered during the production period and a trend has developed. As one would expect, the accuracy of the EAC rate improves when the periodic readings are more closely following the typical curve shape as well as when the physical progress is further along.

In practice, a spreadsheet model can be developed that contains typical points for the calibration curve along with inputs for budget, actual workhours and physical progress. Once constructed, the model can analytically extrapolate the cumulative forecast curve, as well as the EAC. Furthermore, one can test the sensitivity of the EAC to possible variations in productivity by entering trial data providing a range for the EAC. ©
AACE Signs MOU with Hong Kong Institute of Surveyors

During AACE International’s Conference & Expo in June at San Diego, the President of AACE International, Charles E. Bolyard, Jr., CFCC PSP FAACE, signed a Memorandum of Understanding with The Hong Kong Institute of Surveyors. The President of The Hong Kong Institute of Surveyors (HKIS), Sr Dick Ngok Chung Kwok, was accompanied by other HKIS leadership. Also, present at the signing ceremony were members of AACE International’s Board of Directors.
Examination Delivery and Testing Policy

BY PENNY WHOOLEY

The Certification Board unanimously adopted an Examination Delivery and Testing Policy at their June 23, 2018 meeting held in San Diego, CA. The policy does not alter the current structure or procedures of the program. The policy was developed to summarize existing protocol and procedure regarding examination delivery, testing preferences and restrictions, and accreditation standards into one document.

KEYWORDS
CBT, computer-based testing, testing center, examination, delivery, restriction

BACKGROUND
According to its charter, the Certification Board shall be responsible for planning, directing, and administering the AACE Certification Program. It shall prepare the certification examinations or cause them to be prepared and shall evaluate the performance of individuals who take the examinations.

POLICY
It shall be the policy of the Certification Board to deliver all AACE certification exams through computer-based testing (CBT) with an approved testing vendor of its choosing.

EXAMINATION DELIVERY
The preferred and primary delivery method shall be High-stakes online secured testing (HOST) proctored services. This option delivers exams at an approved testing center with trained, certified proctors onsite who will assist test takers with onsite support and launching the exam.

The Certification Board also reserves the right to permit other delivery methods such as:

• Online proctored testing (OLP): this option will deliver exams to systems that meet minimum system requirements and proctored through webcams for observation by online certified proctors, who will provide support with camera placement, required software installation, biometric authentication and launching the exam.

• Client proctored (CP): this option will deliver exams at the Certification Board's private testing center(s) (e.g., AACE Conference & Expo), who will provide training, administrative and exam launching support to Certification Board members and certification staff, or approved representative(s), acting as proctors for the examination. Candidate testing equipment will be solely at the discretion of the Certification Board (e.g., candidate personal laptop, rented laptops, OLP, HOST, etc.). The term client is not meant to include any other boards, board member(s), region(s), region officer(s), section(s), section officer(s), or any other person outside of the Certification Board.

RESTRICTIONS
The Certification Board strictly prohibits any person, testing center, entity, etc., to deliver or proctor exams if they also directly or indirectly teach, or are involved in teaching or developing preparatory education materials for AACE certification preparation/review courses, or similar. This shall include, but not limited to, known Approved Education Providers (AEP) of AACE.

This restriction is in accordance to CESB Accreditation Guideline, Item 4: (j) Prohibit those involved in the certification of individuals to provide training for the purpose of obtaining such certification.

This standard is interpreted by the accreditation committee to mean that any person who teaches a refresher course for a specific type of examination must not select, assemble, review items, or proctor that examination (a). Source: National Council of Examiners for Engineering and Surveying Manual of Policy and Positions Statements, September 2006, p. 15

The Certification Board, at its sole discretion, may also impose restrictions for any testing center to deliver AACE exams for any reason. Reasons may include, but not limited to, safety or not being conducive to a candidate’s comfort and satisfactory examination performance.

Of course, if you have any questions, you can contact us here at AACE Headquarters at certification@aacei.org or 304.296.8444.
Dr. Akram Saad became an AACE International Certified Cost Professional (CCP) in 2009. He has over 30 years’ experience in the field of project management. He has been a volunteer with the AACE Mentoring Program. He says, “After many years of mentoring service with AACE International, I am more willing to help members and feel connected to the people, the work, and the mission of the association.” He adds, “My goal is to continuously cooperate with members, communicate my experience and lessons learned and establishing meaningful relationships.”

Commenting on the mentoring program, he says, “The mentor who has volunteered, receives reciprocal effects on their own career by investing time in another’s, as well as investing in the future of the organization. You are also gaining a fresh, “newer” perspective though the interaction, and an opportunity to reflect on your own practices. You also retrieve valuable information in your mentoree relationship and an increase of general awareness.” He concludes, “The ability to know others throughout an organization is gained through the mentoring partnership. Many times, throughout our working careers, we get to know our colleagues casually. But through a mentoring partnership, we get to know someone on a deeper level - through sharing thoughts and concepts.”

Saad holds a PhD in Construction and Project Management, received in 2013 in California. Prior to this, he received an MBA in Project Management in 2002 in Missouri. He received a B.Sc. of Civil Engineering and started with the Cairo University faculty of engineering in 1979. In addition to his AACE certification as a CCP, he is PMP certified by the Project Management Institute. He is a member of the Royal Institution of Chartered Surveyors. He is a Level II Coating Inspector and a Protective Coating Specialist, through NACE International; and a member of the Corrosion Society of the US.

Saad has extensive experience in the construction, supervision and management of projects comprising of sports facilities and stadiums, hospitals, health care facilities, hotels, residential, administration, educational, and high-rise buildings, water and sewerage networks, pumping stations, power and desalination plants, cement plant, concrete repair works, marine offshore works, site reclamation, utilities, technical office works, coatings inspection and protective coatings, corrosion control, as well as oil and gas field experience.

Saad received the “Best Legal Counsel of the Year” award at the first Qatar Business Law Forum and Awards that was organized by LexisNexis, in partnership with Qatar Foundation, Qatar University, and the Association of Corporate Counsel (Ace) Middle East in November of 2016. He received a Certificate of Appreciation in recognition of valuable contribution to the Abu Dhabi Center for Children that is managed by “SEHA,” Abu Dhabi Health Services Co. and a Certificate of Achievement in successfully passing an assignment demonstrating an understanding of construction claims.

He holds several certificates including a certificate in MS project advanced by IBM; a certificate in international arbitration with CIArb of the UK; a certificate in LEED as a Green Associate from the US Green Building Council; a certificate in applying the Pearl Community Rating System “Estidama;” and a certificate on construction site safety from the Abu-Dhabi municipality. He is certified in” Permit to Work”- oil field; OSHA Construction.

“The mentor who has volunteered, receives reciprocal effects on their own career by investing time in another’s, as well as investing in the future of the organization.”

— DR. AKRAM SAAD
Industry Safety and Health certified; certified in construction management on behalf of the Institution of Civil Engineers, U.K; holds a certificate in international conditions of contract for construction “FIDIC” and a certificate in construction claims and disputes management; and a certificate in model and design of high rise buildings using the Etabs program.

He is a member of PMI, the American Society of Civil Engineers (ASCE); Chartered Institute of Arbitrators (CIARB); Structural Engineering Institute (SEI); Environmental & Water Resources Institute (EWRI); NACE American Corrosion Engineering, American Chemical Society (ACS); Engineering Syndicate and the Egyptian Engineers Association. “GROHE” Water Technology; and the UAE Society of Engineers. He is a board member of the Chinese American Scholar Association (CASA) and he is listed in the International Who’s Who of Professionals.


Then he presented at the NACE International Conference, Salt Lake City, Utah, on March 2012, a technical paper titled, “Port Zayed Concrete Rehabilitation.” At the European Institute for Advanced Studies in Management (EIASM) Organizational Change Development Conference, in Bern-Swiss, on September 2012. His technical paper was titled, “Risk Awareness Impact and Mitigation.” He also presented an abstract for the AACE International Total Cost Management Conference, in Dubai, in November 2012.

Saad is a trainer for the following courses: FIDIC and Claims Management Workshops; Certified Commercial Contracts Manager “CCCM” Course as per NCMA program; Certified Cost Professional (CCP) exam preparation course with AACE International; Risk Management Professional (RMP) with PMI and the Fundamental of Civil Engineering.


Editor’s Note: This is the third of a series of Spotlight on Mentoring profiles of AACE members who are currently participating in the AACE International Mentoring program. If reading these profiles inspire you to want to become a mentor, contact the AACE Committee for Mentoring Excellence, by sending an e-mail to: mentoring@aacei.org.

**AACE International Mentoring Program**

Did you know that employees that participated in a mentorship program (mentors and mentees alike) are more likely to receive promotions and/or salary increases? So says the Wharton School of Business, ranked the #1 business school in 2017 by Forbes Magazine.

Did you know that AACE International’s Committee for Mentoring Excellence (CME) offers an e-mentoring service through the Career and Mentoring Center on its website? This member benefit provides mentees (protégés) with potential matches to mentors that share mutual professional interests. Finalizing a “match” is the responsibility of the individual mentors and mentees. Both parties can indicate the amount of time they are willing to commit per week or month and be paired accordingly. This improves the likelihood of a positive mentoring relationship with meaningful dialogue.

Mentees draw from AACE’s pool of experienced and knowledgeable industry leaders to enhance their career potential. Mentors gain valuable insight into what goes on in lower levels. They get the satisfaction of seeing someone develop and potentially make them look good. Plus, they receive CEUs. It’s truly a win, win.

Find out more by visiting web.aacei.org/resources/career-mentoring-center or contact the Committee for Mentoring Excellence at mentoring@aacei.org.
Nour Bouhou was born in a small town near Casablanca called “Mohammedia”, in Morocco. Dr. Bouhou grew up in a patriarchal society, where most Moroccan mothers dream about their daughter’s marriage. However, at a very early age, her mother used to tell her, with a great degree of faith and certainty, that when she grows up, she will hold a doctorate, live within multiple cultures, and take her mother with her to discover new and exotic places. Her mother’s vision was slightly different and avant-garde in the early nineties. Dr. Bouhou did not consciously think about her mother’s hopes until 2012 when suddenly, at 23 years old, and to everyone’s surprise, she decided to leave France, and move to the US to pursue her doctoral degree.

Nour moved to France for her undergraduate and master’s degrees. Dr. Bouhou lived in Tours, Lille and Paris (France). She received her baccalaureate degree from “Al Jolene” High School in “Mohammedia” (Morocco). Her Bachelor’s Degree of Science in Engineering in Ecole Centrale de Lille (France), her Master’s Degree of Science in Civil Engineering in Ecole Centrale de Lille (France), and her Doctor of Philosophy (PhD) in Civil, Architectural and Environmental Engineering (Construction Engineering and Project Management), at The University of Texas in Austin. She wrote her dissertation on, “Assessing the Performance of Demand-Side Strategies and Renewables; Cost and Energy Implications for the Residential Sector.”

After obtaining her bachelor’s degree from the Ecole Centrale de Lille (France), Dr. Bouhou joined a multi-national general contractor on an infrastructure project in Rouen, France, where she was responsible for coordinating concrete work, Mechanical, Electrical and Plumbing (MEP) work and finishes, and monitoring the construction work to ensure that the project was completed on time and within budget. She started noticing the challenges faced on the jobsite, including adverse weather, changed work, subcontractors’ coordination, material delivery delays, and so on. She then realized the urgency of having a robust project controls process to avoid or mitigate some of these challenges. However, the project controls processes were not as developed in France as they were in the US. She further noticed the lack of project controls professionals on her next project that consisted of the renovation of a commercial building in the suburban area of Paris, France. That is when she decided to continue her education in the US to acquire a deeper understanding of both the conceptual and practical sides of project controls.

As a field engineer on construction projects in France, Dr. Bouhou realized the importance of effective and proactive project controls, especially cost and scheduling planning and monitoring. As a claims analyst with Spire, she became further aware of how cost overruns and schedule delays can result in disputes and additional costs to the involved parties. Analyzing projects ex post facto is a fantastic opportunity to use the lessons-learned from the claims and litigation projects toward planning and implementing more effective and realistic cost and scheduling practices in proactive projects.

As part of her PhD dissertation, Dr. Bouhou was heavily exposed to statistical and data mining techniques to design models that assess the cost and energy impacts of renewable and green technologies and predict consumer behaviors to these technologies. She now uses these statistical and data mining techniques to design and build tools that improve project controls practices, for scheduling risk assessment, labor availability assessment and predictions, and schedule as-built validation tools, to name a few. As there are research and improvement opportunities within the project controls arena, Dr. Bouhou aspires to further explore ways to bridge her civil engineering and construction background to her interests in statistical modeling, in order to advance the construction industry and control the uncertainties inherent to this field.
Dr. Nour Bouhou has more than 8 years of experience in the Architectural, Engineering, and Construction (AEC) industry. She assists owners, contractors, and subcontractors across numerous sectors within the AEC industry on both proactive and forensic consulting projects.

She began her career as a field engineer in France, working her way to serving as a construction consultant. In the field, she managed different trades on new construction and renovation projects, in both the public and private arena, on behalf of general contractors and developers. She coordinated safety, quality control and schedule progress via daily walks, subcontractor meetings, and field directions.

Dr. Bouhou is currently a senior consultant at Spire Consulting Group (Spire), working in the San Francisco office. She provides scheduling and change order evaluation services on large scale mixed-used projects, as well as military projects requiring DoD cost-loaded schedule reporting and time impact analysis requirement. In claims situations, she assists with schedule delay analyses, productivity impact assessments, and damages quantifications.

Spire is a multi-disciplined construction consulting and project management firm that provides innovative construction advisory and dispute resolution services needed to deliver complex projects on time and within budget. Spire’s project and construction management experts develop customized and comprehensive programs to successfully manage costs, schedules, and associated risks, creating a results-oriented environment. Spire’s construction engineering experts can also help when a dispute arises on a project and guide clients through the mediation, litigation, and arbitration processes. With more than $54 billion in advised projects over the past 10 years, Spire’s construction and engineering consultants have extensive, hands-on experience supporting a multitude of projects worldwide. From government entities to Top 100 Engineering News-Record (ENR) contractors and Fortune 500 companies, Spire’s consultants have added value to clients’ projects across six offices located throughout the US.

Dr. Bouhou has given several presentations at various seminars and conferences, including her AACE section and the annual AACE Conference and Expo, as well as the Western Winter Workshops. She continuously publishes academic and industry papers in multiple journals and conference proceedings.

Dr. Bouhou was first invited to an AACE Central Texas Section monthly meeting when she was a graduate student. She attended a presentation on risk management and realized that the topics addressed were particularly relevant to the industry and profession as they highlight the best practices and stories, told by experienced professionals. She then decided to become an active member of the organization in 2014 and was appointed as the section’s treasurer in 2015 and the vice president in 2016. When she moved to the Bay Area in 2016, she joined the San Francisco Bay Area Section. This past year, she led the section’s efforts in developing a scholarship program for engineering and construction management students from non-ABET accredited universities in the Bay Area.

Dr. Bouhou’s first AACE Annual Meeting (now the Conference & Expo) was in 2017 in Orlando, Florida, where she presented on, How to Quantify, Identify and Predict Labor Availability in Construction Using Statistical Modeling. Not only was it a fantastic opportunity to interact with experienced professionals on challenges they face with finding labor, but also an excellent platform to broaden her network and learn about latest trends and cutting-edge technologies in project controls. She also attended multiple seminars and presentations focusing on claims, disputes and resolution. These presentations outlined delay and damages quantification methodologies that are well recognized in the industry and discussed recommended practices shared by tenured professionals and testifying experts.

Additionally, Dr. Bouhou recently attended the last Certified Cost Professional (CCP) training organized by the San Francisco Bay Area Section. The training was very enriching, and the quality of the instructors enabled open and dynamic discussions on the certification topics, questions, requirements and real-life experiences from both instructors and students.

Dr. Bouhou’s goal is to take both the Planning and Scheduling Professional (PSP) and Certified Cost Professional (CCP) exams in the near future. Dr. Bouhou also attended the 2018 Annual Conference & Expo and presented on Evaluating Project Performance Using Baseline Schedules. She evaluated and identified a variety of project schedule indicators to determine whether a correlation exists between project performance and the project baseline schedule. Dr. Bouhou’s presentation was attended by almost 100 professionals and fostered an open and constructive discussion on how project controls experts develop reasonable schedules and assess schedule integrity. She attended the Claims, Dispute and Resolution Subcommittee meeting and volunteered to help write and publish AACE Recommended Practices.

Dr. Bouhou is also anticipated to be part of the 2019 AACE Conference & Expo and is looking forward to presenting and publishing on a new topic. Her speaking and training engagements enabled her to improve her presentation skills, personal and physical stamina and leadership drive.

Dr. Bouhou highly encourages project controls and AEC professionals to join the AACE community and engage in leadership positions within the organization. There are always great opportunities to lead the sections and participate in shaping the future of the organization, and the industry at large. She also encourages members and non-members alike to aim at obtaining AACE certifications that are well recognized in the industry.

Dr. Bouhou has a particular and keen appreciation for continued education and research to drive and support the construction industry. As a young professional, she aspires at becoming an industry leader and learn from fellow professionals. As an innate academic, she wishes to grow as a thorough educator and teach future construction and project controls experts that will carry the torch and further shape the industry.
Bijan Bootorabi is a first generation American, born in North Hollywood, California, to immigrant parents. His father is from Iran and his mother from Bolivia. He grew up in Southern California living in both Los Angeles and Escondido.

Bijan attended college in Hawaii and graduated with a Bachelor of Science degree in Applied Mathematics from Hawaii Pacific University. One of his first jobs out of college was tutoring kids from kindergarten to high school. This job taught him how to train others and to remain calm when working with difficult individuals.

In 2015, Bijan began working for Los Angeles Metro as a Transportation Associate. It was an exciting time to work at Metro as they were in the middle of delivering the largest local transportation infrastructure program in US history, valued at $160 billion. He worked in the Program Control department as a systems administrator managing the Project Management Information System (PMIS). PMIS comprised a suite of applications used to manage documents, schedules, changes, and cost. He supported a user community of over 500 professionals and ensured applications were operating smoothly. His clients loved his responsiveness, can do attitude, and great customer service. This opportunity leveraged his planning, organizational, training and communication skills and afforded him promotion.

Bijan currently works at Metro as a Cost/Schedule Assistant and supports planning, scheduling, and cost control on multiple transit and highway projects. He loves working in a public agency like Metro because he is improving the lives of Los Angeles commuters. He has fun working on construction projects and says they are both satisfying and fulfilling. He followed in his dad’s footsteps as his dad is a civil engineer and has worked managing construction projects for over 30 years.

Bijan developed the Master Schedule that was part of the Program Management Plan to support the Measure M ballot measure in 2016. The Master Schedule spanned 50 years and displayed all of the major transportation projects for both Measure R and M. Each project was displayed on a separate line and color coded to distinguish the phases of the project life cycle. The Master Schedule was coveted and widely distributed among Los Angeles County constituents and Metro senior management. The schedule was also used for discussions at a White House Transportation Forum.

Bijan was introduced to AACE International by Metro management. Over half of the Program Control department staffs are AACE members. Metro regularly uses training material from the on-line learning library and offers monthly webinars to staff. Bijan enjoys learning from the AACE Recommended Practices and using them as a resource to review schedules and develop time impact analyses.

Bijan enjoys attending AACE events. He attended the Western Winter Workshop and says it was amazing with a great variety of technical presentations and panel discussions. He says ‘participating in AACE is a great opportunity to meet and network with industry experts from around the US and the world.’

Bijan is continuing his education and pursuing a Construction Management certificate from the UCLA Extension. He is also studying to obtain the Certified Scheduling Technician (CST) certification from AACE International.

Bijan’s advice to others is to “Always be open to learning something new. If you ever get comfortable with what you know, remind yourself that comfort can close off your mind from learning and no one grows in their comfort zone.”

“Always be open to learning something new. If you ever get comfortable with what you know, remind yourself that comfort can close off your mind from learning and no one grows in their comfort zone.” — BIJAN BOOTORABI
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Overview of As-Planned Versus As-Built Forensic Schedule Analysis:
AACE International Recommended Practice No. 29R-03 Forensic Schedule Analysis MIP 3.1 and 3.2

BY SCOTT A. GALBRAITH, PE CFCC; MICHAEL T. SIBURT, PE CCP PSP; AND JOHN C. LIVENGGOOD, ESQ. CCP CFCC PSP FAACE

ABSTRACT
As-planned versus as-built forensic schedule analysis is a method used to identify and quantify delays and, most importantly, the delays that led to the later-than-planned completion of a project. The intent of this article is to provide the reader with an overview of as-planned versus as-built forensic schedule delay analysis. The Method Implementation Protocols (MIP) for this type of analysis are presented in AACE International’s (AACE) Recommended Practice 29R-03, Forensic Schedule Analysis (RP29R-03), Section 3.1 Observational/Static/Gross (MIP 3.1) and Section 3.2 Observational/Static/Periodic (MIP 3.2). The selection of the schedule delay analysis methodology used for a dispute arising from a particular project ultimately is the responsibility of the schedule analyst. In many situations, the methodology chosen may be based on requirements of the contract between the parties. In other situations, the schedule analyst is free to choose the methodology he or she believes best communicates his or her opinions based on the facts of the dispute and available contemporaneous project documentation. This article presents information about the procedures associated with MIP 3.1 and MIP 3.2 for consideration by the schedule analyst as may be applicable to the specific dispute at hand.

1. INTRODUCTION
As-planned versus as-built forensic schedule analysis is a method used to identify and quantify delays and, most importantly, the delays that led to the later-than-planned completion of a project. The intent of this article is to provide the reader with an overview of as-planned versus as-built forensic schedule delay analysis. The Method Implementation Protocols (MIP) for this type of analysis are presented in AACE International’s (AACE) Recommended Practice 29R-03 Forensic Schedule Analysis (RP29R-03), Section 3.1 Observational/Static/Gross (MIP 3.1) and Section 3.2 Observational/Static/Periodic (MIP 3.2).
As with the overall RP29R-03, [1] specifically, this article:

‘…is not intended to establish a standard of practice, nor is it intended to be a prescriptive document applied without exception. Therefore, a departure from the recommended protocols should not be automatically treated as an error or a deficiency as long as such departure is based on a conscious and sound application of schedule analysis principles. As with any other recommended practice, the RP should be used in conjunction with professional judgment and knowledge of the subject matter. While the recommended protocols contained herein are intended to aid the practitioner in creating a competent work product it may, in some cases, require additional or fewer steps.’

‘…primarily focuses on the use of [as-planned versus as-built] forensic scheduling techniques and methods for factual analysis and quantification as opposed to assignment of delay responsibility. This, however, does not preclude the practitioner from performing the analysis based on certain assumptions regarding liability.’

‘…is not intended to be a primer on [as-planned versus as-built] forensic schedule analysis. The reader is assumed to have advanced, hands-on knowledge of all components of CPM analysis and a working experience in a contract claims environment involving delay issues.’

The selection of the schedule delay analysis methodology used for a dispute arising from a particular project ultimately is the responsibility of the schedule analyst. In many situations, the methodology chosen may be based on requirements of the contract between the parties. In other situations, the schedule analyst is free to choose the methodology he or she believes best communicates his or her opinions based on the facts of the dispute and available contemporaneous project documentation. This article presents information about the procedures associated with MIP 3.1 and MIP 3.2 for consideration by the schedule analyst as may be applicable to the specific dispute at hand.

2. TAXONOMY AND NOMENCLATURE
RP29R-03 correlates common names for various forensic schedule analysis methods to taxonomic classifications comprised of five layers: timing, basic and specific methods, and the basic and specific implementation of each method. These layers are explained in detail in RP29R-03, Section 1.4.

In summary, as-planned versus as-built analyses are classified in RP29R-03 as:

• Retrospective (Layer 1: Timing) – performed after the delay has occurred.
• Observational (Layer 2: Basic Method) – analysis of the schedule, in general, performed without making any changes to the schedule.
• Static Logic (Layer 3: Specific Method) – performed based on comparison of as-built schedule to an as-planned schedule (preferably the approved or accepted baseline schedule).
• Gross or Periodic (Layer 4: Basic Implementation)
  ◦ Gross – analysis of the entire project duration as a single period
  ◦ Periodic – analysis of the entire project duration in segments
• Fixed Periods or Variable Periods (Layer 5: Specific Implementation) – applicable to Periodic Layer 4, but not applicable to Gross Layer 4 since that analysis is of the entire period as a single period.
• Fixed Periods – analysis periods established by fixed dates and durations as defined by data dates used for contemporaneous schedule updates.
  ◦ Variable Periods – analysis periods not established by data dates corresponding to contemporaneous schedule updates, rather by dates selected by the analyst that may represent dates such as:
    • Key milestones along the critical path
    • Changes in the critical path
    • Issuance of an agreed upon revised or recovery baseline schedule

RP29R-03 notes that retrospective/observational/static logic analyses are commonly referred to as “as-planned versus as-built” analyses and distinguishes between the gross and periodic basic implementation versions within this taxonomy by noting that periodic analyses are performed by comparing the as-planned and as-built data in time slices, sometimes called “windows.”

3. COMMON NAMES
Forensic schedule analyses performed in general accordance with MIP 3.1 and MIP 3.2 are commonly referred to as:

• As-Planned versus As-Built
• AP versus AB
• Planned versus Actual
• As-Planned versus Update

4. UNDERLYING FUNDAMENTALS AND GENERAL PRINCIPLES
The following provides further information with respect to how the general principles identified in RP29R-03, applicable to forensic schedule analyses in general, specifically apply to MIP 3.1 and MIP 3.2.

• Use CPM Calculations—Calculation of the as-planned critical path and determination of the as-built critical path must be based on CPM scheduling principles and proper logic.
• Data Date—Schedule updates must apply the use of a data date – status all activities that have started and/or finished, including appropriate actual dates, remaining duration, and percentage complete values as of the same (data) date—in order to have a complete understanding of the effect of all remaining activities on the forecasted project completion.
• Shared Ownership of Network Float—Unless stated otherwise in the contract, float belongs to the project and is available for use by the owner and contractor.
• Update Float Preferred Over Baseline Float—Available float values as determined in validated and contemporaneous schedule updates closer to the time the contractor actually performs an activity is preferred over baseline values for those same activities. This is a result of the effect reported actual start and finish dates and percentages complete associated with other activities have on other logically tied activities, as well as possible logic changes that may have been made to the schedule throughout the project up to the time the activity actually occurs.
• Sub-Network Float Values—Calculated float values associated with a string of activities will likely be different if calculated independent of all other activities in the overall schedule than if calculated when incorporated into the overall schedule. This can have a significant impact on float calculations when looking at an individual subcontractor’s work activities, an individual area, or any other subset of the overall schedule independent of all other activities in the schedule.
As-planned versus as-built analyses involve comparison of a planned schedule (preferably an accepted or approved baseline) to as-built dates from an as-built schedule or other updated schedule that includes reported progress, or other means as discussed further later in this article. RP29R-03 identifies three types of as-planned versus as-built analyses and distinguishes between them in MIP 3.1 and MIP 3.2 and then identifies two specific implementation variations of MIP 3.2. Specifically, RP29R-03 defines these three implementations as:

- **MIP 3.1 – Observational/Static/Gross**
- **MIP 3.2 – Observational/Static/Periodic**
  - Fixed Periods
  - Variable Periods

RP29R-03 states MIP 3.2 “analyzes the project in multiple segments rather than in one whole continuum” as in MIP 3.1, and goes on to state:

“Because this (MIP 3.2) is essentially an enhancement of MIP 3.1, as a practical matter, the implementation of MIP 3.2 requires that prerequisites for MIP 3.1 be implemented first.”

Since much of the analysis involved in the three types of as-planned versus as-built analyses is the same, the method of implementation specifics presented in this article apply to all three unless stated otherwise.

The as-planned versus as-built methodology is sometimes erroneously confused with a “total time” analysis. Total time analysis simply compares the planned completion date with the actual date, and in most general applications, assigns all that delay to a single, typically opposing, party. While the procedure described for a total time analysis uses the as-planned schedule and compares its completion to the as-built completion, the total time implementation fails to capture the necessary analysis for a proper as-planned versus as-built methodology described by this article. Specifically, in contrast to the total time analysis, the as-planned versus as-built methodology evaluates progress on an activity-by-activity basis and allows for identification of critical path delay on specific dates based on actual events on the project.

### 5.2. Recommended Source Validation Protocols

Section 2 of RP29R-03 provides four recommended Source Validation Protocols (SVP) pertaining to validating source data and identifying and quantifying delays as part of a forensic schedule analysis. The SVPs are:

- **SVP 2.1 – Baseline Schedule Selection, Validation, and Rectification**
- **SVP 2.2 – As-Built Schedule Sources, Reconstruction, and Validation**
- **SVP 2.3 – Schedule Updates: Validation, Rectification, and Reconstruction**
- **SVP 2.4 – Identification and Quantification of Discrete Delay Events and Issues**

A significant portion of as-planned versus as-built analyses involve comparison of data included in contemporaneous schedules, thus schedule data validation is crucial to reducing the chance of incorrect findings simply because the data used as the basis of the analysis was incorrect. The early stages of an as-planned versus as-built analysis should include source data validation to limit potential re-work that may be required if that as-built data is subsequently found to be incorrect.

SVP 2.1, SVP 2.2 or 2.3, and SVP 2.4 are recommended protocols for use in each as-planned versus as-built analysis. See RP29R-03, Section 2, for details associated with the implementation of each of these protocols.

### 5.3. Recommended Minimum Implementation Protocols

In its simplest form, an as-planned versus as-built analysis uses differences between planned and actual start and finish dates and/or activity durations to provide information from which delays, to the extent they exist in the performance of an activity, are identified and quantified and opinions formed. The comparison of actual dates should be made against planned dates to determine the delays to activity start and finish dates. If the analyst compares actual dates against early dates, then the resulting number will include float if the activity was not on the critical path in the planned schedule.

The typical procedures to perform a basic as-planned versus as-built analysis on a relatively simple project include:

- Determine the baseline or other as-planned schedule that will be used. The preference should be to use the accepted (or approved) baseline schedule if one exists. This will allow for comparison of actual performance against a plan that the parties agreed was acceptable, at least early in the project. The more mutually-agreed-upon data that can be used in a forensic schedule analysis the better it is for all involved since it will reduce the number of items in dispute and focus discussion on differences in opinions formed based on interpretation of the data. Reference RP29R-03, Section 2, SVP 2.1 for more detailed recommendations about baseline schedule selection and validations.
- Determine the source(s) of as-built data that will be used. Validate as-built dates for planned and added work activities. Reference RP29R-03, Section 2, SVP 2.2, for more detailed recommendations about as-built schedule sources and data,
including discussion on the creation of a “Daily Specific As-Built” (DSAB).

- Compare as-planned late dates versus actual dates and planned durations versus actual durations for activities starting with the earliest planned activities and progressing through the latest planned activities. For each activity, calculate the difference between the planned late start versus actual start date, planned late finish versus actual finish date, and planned duration versus actual duration. All calculations should be performed on both a workday and calendar-day basis.

- In commercially-available CPM schedule software, the forecasted dates for each activity are determined based on available workdays within the specific calendar assigned to each activity. It is possible, and in fact likely, that multiple calendars with different available workdays exist within the CPM schedule software. As such, if an activity is assigned to a calendar which limits workdays to anything less than a 7-workday work week, then the as-planned original duration for each of those activities must first be calculated on a calendar day basis prior to performing the calculations to determine the difference between the planned original duration and actual durations. For example, if a 5-workday activity is assigned to a calendar that allows 5 workdays per week, the 5-workday original duration must be adjusted by a factor of 7/5 (7 calendar days per week/5-workday workweek in the calendar) for a planned duration of 7 calendar days.

- Based on the calculations above, determine the activities that experienced the largest differences between planned late start and/or finish dates and actual start and/or finish dates (actual date minus planned date) at any given point in time as the project progresses from start to finish, and then determine if these activities, or others based on construction experience, contemporaneous documentation, and expert opinion, represent a reasonable as-built critical path. Determination of the as-built critical path is discussed in detail in Section 5.5 of this article.

- In either MIP 3.1 or MIP 3.2, the assessment of activity status can occur at any point during the performance of the project. This process may begin initially by assessing the relative status of activities at a key contractual milestone. As the schedule analyst continues the as-planned versus as-built forensic schedule analysis, the assessment of activity status will occur at smaller increments, such as to align with the project’s periodic schedule updates, and may occur as frequently as individual days as necessary to determine changes, or potential changes, to the as-built critical path. See Section 5.4 of this article for more discussion on enhanced implementation protocols.

- Analyze differences between as-planned late dates and actual dates and between

### FIGURE 1. Example Project – As-Planned Activities

<table>
<thead>
<tr>
<th>Activity ID</th>
<th>Activity Name</th>
<th>Original Duration (WDs)</th>
<th>Early Start</th>
<th>Early Finish</th>
<th>Late Start</th>
<th>Late Finish</th>
<th>Total Float</th>
<th>Successors</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>Notice to Proceed</td>
<td>0</td>
<td>3-Apr-17</td>
<td>3-Apr-17</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>20</td>
</tr>
<tr>
<td>20</td>
<td>Clear &amp; Grub</td>
<td>0.020</td>
<td>3-Apr-17</td>
<td>28-Apr-17</td>
<td>3-Apr-17</td>
<td>28-Apr-17</td>
<td>0</td>
<td>30</td>
</tr>
<tr>
<td>30</td>
<td>Excavate</td>
<td>70</td>
<td>1-May-17</td>
<td>8-Aug-17</td>
<td>1-May-17</td>
<td>8-Aug-17</td>
<td>0</td>
<td>40</td>
</tr>
<tr>
<td>40</td>
<td>Grade</td>
<td>20</td>
<td>9-Aug-17</td>
<td>6-Sep-17</td>
<td>9-Aug-17</td>
<td>6-Sep-17</td>
<td>0</td>
<td>50, 80</td>
</tr>
<tr>
<td>50</td>
<td>Place Subgrade</td>
<td>30</td>
<td>7-Sep-17</td>
<td>18-Oct-17</td>
<td>7-Sep-17</td>
<td>18-Oct-17</td>
<td>0</td>
<td>60</td>
</tr>
<tr>
<td>60</td>
<td>Place Base Course</td>
<td>15</td>
<td>19-Oct-17</td>
<td>8-Nov-17</td>
<td>19-Oct-17</td>
<td>8-Nov-17</td>
<td>0</td>
<td>70</td>
</tr>
<tr>
<td>70</td>
<td>Place Surface Course</td>
<td>15</td>
<td>9-Nov-17</td>
<td>30-Nov-17</td>
<td>9-Nov-17</td>
<td>30-Nov-17</td>
<td>0</td>
<td>100</td>
</tr>
<tr>
<td>80</td>
<td>Place Sidewalk</td>
<td>10</td>
<td>7-Sep-17</td>
<td>20-Sep-17</td>
<td>7-Sep-17</td>
<td>20-Sep-17</td>
<td>0</td>
<td>90</td>
</tr>
<tr>
<td>90</td>
<td>Plant Landscaping</td>
<td>5</td>
<td>21-Sep-17</td>
<td>27-Sep-17</td>
<td>21-Sep-17</td>
<td>27-Sep-17</td>
<td>0</td>
<td>100</td>
</tr>
<tr>
<td>100</td>
<td>Project Completion</td>
<td>0</td>
<td>30-Nov-17</td>
<td>30-Nov-17</td>
<td>30-Nov-17</td>
<td>30-Nov-17</td>
<td>0</td>
<td>100</td>
</tr>
</tbody>
</table>

### FIGURE 2. Example Project – As-Built Data

<table>
<thead>
<tr>
<th>Activity ID</th>
<th>Activity Name</th>
<th>Actual Start</th>
<th>Actual Finish</th>
<th>Actual Duration (WDs)</th>
<th>Actual Duration (CDs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>Notice to Proceed</td>
<td>4/3/2017</td>
<td></td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>30</td>
<td>Excavate</td>
<td>5/1/2017</td>
<td>5/8/2017</td>
<td>55</td>
<td>70</td>
</tr>
<tr>
<td>40</td>
<td>Grade</td>
<td>9/1/2017</td>
<td>9/22/2017</td>
<td>50</td>
<td>34</td>
</tr>
<tr>
<td>50</td>
<td>Place Subgrade</td>
<td>9/21/2017</td>
<td>11/1/2017</td>
<td>41</td>
<td>30</td>
</tr>
<tr>
<td>60</td>
<td>Place Base Course</td>
<td>11/2/2017</td>
<td>3/7/2018</td>
<td>125</td>
<td>25</td>
</tr>
<tr>
<td>70</td>
<td>Place Surface Course</td>
<td>3/8/2018</td>
<td>3/28/2018</td>
<td>20</td>
<td>15</td>
</tr>
<tr>
<td>80</td>
<td>Place Sidewalk</td>
<td>11/15/2017</td>
<td>3/6/2018</td>
<td>111</td>
<td>15</td>
</tr>
<tr>
<td>90</td>
<td>Plant Landscaping</td>
<td>3/1/2018</td>
<td>3/7/2018</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>100</td>
<td>Project Completion</td>
<td>3/24/2018</td>
<td></td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

### FIGURE 3. Example Project – As-Planned Versus As-Built Dates and Durations Comparisons

<table>
<thead>
<tr>
<th>Activity ID</th>
<th>Activity Name</th>
<th>Late Start - Actual Start (WDs)</th>
<th>Late Finish - Actual Finish (WDs)</th>
<th>Late Start - Actual Start (CDs)</th>
<th>Late Finish - Actual Finish (CDs)</th>
<th>Actual Duration - Original Duration (CDs)</th>
<th>Actual Duration - Original Duration (workdays)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>Notice to Proceed</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>20</td>
<td>Clear &amp; Grub</td>
<td>0</td>
<td>35</td>
<td>0</td>
<td>20</td>
<td>0</td>
<td>20</td>
</tr>
<tr>
<td>30</td>
<td>Excavate</td>
<td>0</td>
<td>55</td>
<td>0</td>
<td>70</td>
<td>0</td>
<td>70</td>
</tr>
<tr>
<td>40</td>
<td>Grade</td>
<td>0</td>
<td>50</td>
<td>0</td>
<td>34</td>
<td>0</td>
<td>34</td>
</tr>
<tr>
<td>50</td>
<td>Place Subgrade</td>
<td>-19</td>
<td>-14</td>
<td>-14</td>
<td>-14</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>60</td>
<td>Place Base Course</td>
<td>-12</td>
<td>-14</td>
<td>-14</td>
<td>-14</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>70</td>
<td>Place Surface Course</td>
<td>-20</td>
<td>-119</td>
<td>-119</td>
<td>-119</td>
<td>105</td>
<td>105</td>
</tr>
<tr>
<td>80</td>
<td>Place Sidewalk</td>
<td>-4</td>
<td>-104</td>
<td>-6</td>
<td>-104</td>
<td>98</td>
<td>98</td>
</tr>
<tr>
<td>90</td>
<td>Plant Landscaping</td>
<td>-5</td>
<td>-97</td>
<td>-97</td>
<td>-97</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>100</td>
<td>Project Completion</td>
<td>-20</td>
<td>-118</td>
<td>-20</td>
<td>-118</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
as-planned and actual durations of activities that are on the as-built critical path and near-critical paths and determine timing, duration, and reason for each delay. This process should incorporate extensive analysis of available project documentation for the schedule analyst to use as support for his or her conclusions.

- Reconcile differences between delays to the as-built critical path and approved time extensions, to the extent that time extensions were granted.
- Reconcile differences that may exist between delays to individual as-built critical path activities and delays to project completion. A delay that is determined to have caused a delay during the performance of an as-built critical path activity may be the cause of a delay to a subsequent critical path activity that is much later in the project. An example of this is a delay to one activity that delays a weather-dependent activity from being performed during an anticipated good weather period to a winter weather period. Such delay to the second activity may show up in the delayed start of the activity, but not in the actual duration of the activity, if the actual duration is the same as the planned duration.

In general, an expert having performed these procedures for a basic as-planned versus as-built forensic schedule analysis will be able to form an opinion as to the timing, amount, and reason for delays that caused the late completion of a project.

5.4. Recommended Enhanced Implementation Protocols

On more complex projects or projects for which the as-planned and as-built critical paths may be significantly different, an as-planned versus as-built forensic schedule analysis may require more in-depth analysis to provide the information necessary to form a well-founded and supportable opinion. In these situations, an as-planned versus as-built analysis simply comparing activity dates and durations at periodic intervals may not result in enough detail to make informed decisions and therefore may require calculations on as much as a day-for-day basis while activities were in progress (see discussion of Daily Delay Measure (DDM) in RP29R-03, Section 3.1, F). While possible to do by hand, these calculations are more easily performed and analyzed using an electronic spreadsheet or database.

5.5. As-Built Critical Path Identification

Determination of the as-built critical path is one of, if not the most significant part of an as-planned versus as-built analysis. It is also one of the most contested parts of an as-planned versus as-built analysis.

A schedule analyst cannot determine the as-built critical path using a commercially-available computer scheduling software. A schedule analyst should consider as much contemporaneous documentation as possible and based on facts, CPM scheduling and construction principles, and his or her own experience, determine a reasonable as-built critical path that fits the project circumstances. Without a reasonable and supportable determination of the as-built critical path, any comparison to a plan and determination of delays as critical delay is equally unsupportable.

Prior to attempting to determine the as-built critical path, the analyst should first understand the project requirements including the contract, scope of work, special (non-standard) requirements, contractor’s original as-planned schedule, and general construction sequencing. With this understanding, followed by validation of the as-planned schedule and as-built data and recommended calculations noted previously, the analyst can begin the process of determining the activities that were controlling the progress to project completion at any given point during the project. The analyst should also carefully analyze any potential critical and near-critical activities to determine if there were significant periods of no work between activity actual start and actual finish dates. This process can be a relatively quick determination on a small and non-complex project, however, it can be equally lengthy on a major and complex project and involve analysis of numerous near-critical paths prior to a final determination.

While going through the process of determining the as-built critical path, consideration of the following can provide useful information to assist the analyst in supporting and/or rejecting activities being considered part of the as-built critical path:

![FIGURE 4. Example Project – Graphical Comparison Of As-Planned Versus As-Built Dates](source/AUGUST2018)
5.6 Concurrency and Pacing

Concurrent delay and pacing are often presented as arguments by one of the parties to a delay dispute to offset a delay for which the party may be responsible, and more specifically, in an attempt to limit responsibility for liquidated damages or for extended general conditions costs claims for which the party may be responsible. In general, concurrent delay can be described as: two or more delays occurring at the same time that are the legal responsibility of different parties, each of which, independent of the other, delay the completion of the project.

Since the topic of concurrent delay could be a topic unto its own, this article will not address the topic in depth. However, the concept of concurrent delay and the similar components to pacing arguments should be understood by an analyst and taken into consideration in a forensic schedule analysis if it is believed that they may have existed. The reader is referred to RP29-03, Section 4.2 Identification and Quantification of Concurrent Delay, for more details of the topic.

5.7 Quantification of Delays

Critical delays computed during a forensic schedule analysis are typically grouped into one of three categories based on the cause and party responsible for each of the delays:

1. **Excusable, Compensable**—A critical delay to the project completion for which the contractor is due a time extension and additional compensation.

2. **Excusable, Non-Compensable**—A critical delay to the project completion for which the contractor is due a time extension but no additional compensation.

3. **Non-Excusable (or Inexcusable)**—A critical delay to the project completion for which the contractor is not due a time extension nor additional compensation and may be exposed to assessment of liquidated damages.

Prior to the categorization of each delay the analyst should have a full understanding of the project specifications, particularly those pertaining to delays since contract language may specify how certain delays and delay associated costs are to be addressed. In addition, an analyst must be careful to reconcile calculated critical activity delays with the delay to project completion, or in some circumstances to interim completion milestones. These are not always day-for-day and must take into consideration non-workdays (such as weather, holidays, etc.) incorporated into the contract and schedule.

The as-planned versus as-built methodology calculates delay as it actually occurred. At any measurement point, it does not consider future events on the project, either planned or actual, but allows for forensic identification and quantification of delays, or conversely accelerations, when they occurred. Since it reflects the actual delay as measured at the activity under consideration, the analyst should consider that delays that show up in subsequent as-built critical path activities may have an earlier delay as the root cause.

5.8 Quantification of Mitigation/Acceleration

Comparison of as-planned versus as-built dates cannot demonstrate, on its own, that a contractor mitigated potential delays especially if arguing it did so by accelerating its work on certain activities. However, an as-planned versus as-built analysis can demonstrate the potential that this may have occurred. The analyst should consider the following, and determine if they represent signs the contractor may have mitigated delays through acceleration:

- Does the as-built critical path include out-of-sequence work? If the out-of-sequence work was performed by mobilizing additional workers and/or equipment, then the out-of-sequence work may have been accomplished through acceleration. If the out-of-sequence work was performed by ignoring preferential logic and did not involve mobilizing additional workers and/or equipment, then the contractor may have mitigated potential further critical delay without incurring additional costs and thus not accelerated.

- Was the as-built duration significantly less than the as-planned duration for any activity or activities on the as-built critical path? If so, and if the contractor can demonstrate it expended significantly more worker-hours and/or equipment (than planned) to accomplish this reduced duration, then the contractor may be able to demonstrate acceleration. However, if the contractor’s actual worker-hours and/or equipment expended to accomplish the activity were essentially the same or less than planned, then the reduced duration may have been the result of an over-estimated duration and been achieved at no additional costs to the contractor.
6. GROSS VERSUS PERIODIC AS-PLANNED VERSUS AS-BUILT ANALYSES

As-planned versus as-built analyses are performed by implementing the same basic steps regardless of whether they are performed using a gross (entire project) duration or by breaking the project into smaller performance periods with fixed or variable durations. Properly performed, the analyses should produce the same result.

The specific type of as-planned versus as-built analysis selection is most often one of preference of the analyst and can be influenced by the complexity of the project and available project documentation. A forensic schedule analysis of a relatively simple project may be easily presented using the gross method, while a project with numerous critical path activities, multiple phases or interim milestones, or changes in the critical path between as-planned and as-built will likely be easier to present, and easier for a trier of fact to understand, using a periodic analysis.

7. METHOD SELECTION

A properly performed as-planned versus as-built forensic schedule analysis allows the analyst to determine what the parties planned, what actually happened, and the quantification of any discrepancies between the two. The analyst is essentially telling the story of the project based on supported facts instead of hypothetical or what-if scenarios that may have never occurred or may not have been controlling when they did occur. The as-planned versus as-built forensic schedule analysis methodology has been accepted by courts because of its ease of understanding, its basis upon the original plan for the project and actual events, and its avoidance of hypothetical projections. Further, because it measures delay or acceleration as it actually occurs and does not forecast future events, it more closely reflects contemporaneous progress than many other forensic schedule delay methodologies. Like all forensic schedule delay methodologies, the methodology can be manipulated or, if done without sufficient care, result in poorly supported conclusions. Understanding some of the common criticisms of the methodology will assist the analyst in developing a more accurate and better supported set of conclusions.

The following list contains some of the more common criticisms and purported limitations of the as-planned versus as-built forensic schedule analysis methodology, including those noted in RP29R-03, and ways in which these criticisms or limitations may be mitigated:

- **Unreliable for Use in Analyzing Long Duration Projects**—This argument may be overcome by carefully identifying the changes in actual progress and explaining how and why the analyst determined activities appear on or disappear from the as-built critical path.
- **Unreliable for Use in Analyzing Projects Constructed in a Manner Significantly Different From Planned**—This may be overcome by accounting for and reconciling the impact of differences between the as-planned and as-built approaches to constructing the project when determining and quantifying critical delays. Analyzing and explaining sequencing changes incorporated into any contemporaneous “re-baseline” schedule also provides a mechanism through which to increase reliability in these situations.
- **Unreliable for Projects With Multiple Concurrent Critical Paths**—Whether the multiple concurrent critical paths exist in the as-planned schedule or are determined at times in the as-built performance of the project, the reliability is improved by not only analyzing both the as-planned and as-built critical paths but also near-critical paths, and any other paths as necessary and appropriate, instead of a singular as-planned or as-built critical path.
- **Choices and Use of Select As-Builts Data From the Schedule May Give Appearance of Manipulation**—This may be overcome by validating the as-built data in contemporaneous schedules with other contemporaneous documents. In addition, the use of the enhanced implementation techniques discussed in Section 5.4 of this article, allow the analyst to provide daily justification for the selection of each as-built date based on the whole of available project data, not just data from the project schedule.
- **Choices and Use of Select Start and End Dates of Periods**—This may be overcome by selecting period start and finish dates based on standard periods used contemporaneously during the project (i.e., schedule update data dates), as-built critical path activity start or finish dates, or contract milestone dates, and thoroughly documenting the reason for each selection.
- **May Not Identify All Critical Delays**—This may be overcome by progressing the analysis from the start of the project through completion.
- **Does Not Account for Granted Time Extensions**—This may be overcome by reconciling the findings with approved time extensions and the determined cause and specific dates of the as-built critical path delays.
- **Does Not Adequately Consider Pacing Issues**—This may be overcome by combining the as-planned versus as-built analysis of critical and near-critical paths with analysis of planned versus actual resource data and other contemporaneous documentation.
- **Does Not Consider That Changes to the As-Planned Schedule May Have Been the Actual Cause of Delay Versus Other Identified Delays**—This occurs when an analyst relies solely on comparison of as-planned versus as-built dates and focuses quantification of delay on activities that show the greatest differences between the two without reconciling delays based on all factors. This can be overcome by analyzing out-of-sequence progress and using other contemporaneous documentation to support findings as to why.
- **Typically Fails to Consider Chronological Order of Delays**—This may be overcome by progressing analysis from the start of the project through completion.
- **Typically Fails to Reconcile New Forecasted Critical Paths in Periodic Schedule Updates With the Analyst-Determined As-Built Critical Path**—This may be overcome by analyzing critical and near-critical paths instead of a single path. In addition, this may be overcome by using periodic schedule updates and other contemporaneous documentation to assess the intent of the parties and any influence that had upon the actions or inactions of any party ultimately determined responsible for critical path delay.
- **Unreliable for Clearly Demonstrating Acceleration**—This may be overcome by combining findings from the as-planned versus as-built analysis of critical and near-critical paths with analysis of planned versus actual resource data and other contemporaneous documentation.
- **Project Specification Changes Section Requires Use of Another Methodology**—This argument typically applies to the parties’ consideration of a potential change and agreement prior to the performance of changed or added work during the course of construction. Most
contracts are silent as to how to analyze critical delays after they have occurred. In these situations, the schedule analyst may determine that the as-planned versus as-built methodology is the appropriate retrospective analysis technique for the project in question.

• **As-Built Critical Path Does Not Really Exist Since It Is Not a Calculated Path**—The as-built critical path represents the path of interrelated activities (based on analysis of as-built logic, actual events, circumstances, and actions of the project participants, and CPM scheduling principles), that in the expert's opinion, controlled the project finishing when it did. As discussed previously in this article, commercially available CPM software programs only perform calculations on the portion of the schedule forward (future) from the data date (in other words, the work yet to be performed or yet to be completed). As such, these programs do not, and cannot, determine the as-built critical path at any point during the project.

• **Methodology is a ‘total time’ analysis**—this is typically the case when an analysis is presented that states the total delay based simply on a comparison of the planned and actual project completion dates and then identifies causes of delay without assigning the delays to specific as-built critical path activities nor identifying the specific dates the delays occurred. This may be overcome with detailed review of the project record and by identifying specific delays to the as-built critical path, including the issue, the delayed critical path activity, the date(s) the delay occurred, and quantification of the total corresponding delay.

# REFERENCES

1. AACE® International Recommended Practice 29R-03, Forensic Schedule Analysis, TCM Framework: 6.4 — Forensic Performance Assessment, April 25, 2011 Revision

# APPENDIX — EXAMPLE PROJECT

## As-Planned Schedule Activities

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# ABOUT THE AUTHORS

Scott A. Galbraith, is with MBP. He can be reached by sending e-mail to: sгалbraith@mbpce.com

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### 2017 Cost Engineering Journal Is Available in Print From Amazon

A combined print version of all six issues of the 2017 Cost Engineering journal, AACE International’s peer reviewed professional technical journal, are now available for purchase in hard copy print format at Amazon.com. Click the button to purchase. The Cost Engineering journal in 2017 was offered only in digital PDF format as an AACE member benefit. This print edition is designed for those who maintain a personal library of the journal in hard copy print format and for libraries and engineering schools that can benefit from having a print format edition on the shelves.
AACE® INTERNATIONAL

Awards

AACE International was honored to be able to recognize all award winners at this year’s Conference & Expo. It is through such outstanding ability, service, and dedication displayed by our members that AACE International is able to continue to be the strong organization that it is. Our thanks go to you for the hard work, long hours, heartfelt involvement, and commitment to excellence that these awards symbolize. It is our great pleasure to share these awards with you and to acknowledge everything you have given to AACE International. Congratulations!

Outstanding Regional Director

This award is in recognition of outstanding service through the office of Regional Director and is selected annually by the Vice President Regions-North America and the Vice President Regions-International from among the current regional directors.

Leslie E. McMullan, FAACE – A member since 1977, Les has been very active with his local section for several decades. He is a frequent and well-respected speaker at AACE’s Conferences and other events. He served AACE as Director-Region 1 (2016-2018). Les was recently elected as Vice President Membership – North America (2018-2020). He is the Global Director, Project Controls at Hatch. Les was previously recognized by AACE as a Fellow (2012).

Outstanding Rising Professional Award

This award was established in 2011 to honor the younger generation of professionals in the cost and management field and who have made a significant contribution to the profession.

W. Regis Fox, PSP – Regis joined AACE in 2016. He obtained the Planning & Scheduling Professional (PSP) designation in 2017. He has been active with the National Capital Section, most recently serving as President of the section. Regis is the Director of Enterprise Scheduling for Clark Construction Group.

Outstanding Woman in Project Controls Award

This award was established through the Women in Project Controls Committee in 2008 to honor women who have overcome obstacles pursuing the career of project controls and who have made a significant contribution to the profession.

Beth Miller, PSP – Beth joined AACE in 2009 and earned her Planning & Scheduling Professional (PSP) certification in 2014. She has been an active member of the Women in Project Controls Committee as well as the Alaska Section on its Board. Beth is a Project Control Specialist at The Bergaila Companies/Alyeska Pipeline Service Company.
Brian D. Dunfield
Educational Service Award
This award is to publicly recognize and honor the educational teaching achievements over an extended period by an individual who is a member of the cost engineering professional community. The recipient must have advanced the skills and knowledge of cost engineering through teaching, writing, editing, and/or publishing educational materials used to train and educate present and future cost professionals.

Mark T. Chen, PE CCP FAACE Hon. Life –
Mark joined AACE International in 1990. He became a Certified Cost Professional (CCP) in 1991. He has been an active force in the Seattle Section and served as President (2005-2007). Mark was a long-serving member on the AACE Education Board and where he also served as Chair (2002-2004). He has been a frequent author and presenter of Conference & Expo technical papers and skills and knowledge presentations. Mark has previously been honored by AACE with the TCM Excellence Award (2000), AACE Fellow (2013), and Honorary Life Membership (2013).

John Jeffrey Hannon –
Jeff has been an engineering technology professor at the University of Southern Mississippi located in Hattiesburg, Mississippi for nearly 15 years. He previously served on AACE International’s Education Board where he contributed to the CCP and CEP study guides.

Dr. David T. Hulett, FAACE -
David became a member of AACE in 1999. He is a leader in creating modern concepts and methods for quantitative schedule and cost risk analysis. He has authored two independently published books on schedule and integrated cost-schedule risk analysis as well as articles in Cost Engineering. David is the principal author of two AACE Recommended Practices (RPs). He has presented at AACE and other professional conferences. He is the President of Hulett & Associates, LLC with consulting clients in the US, Canada, South America, Asia and Europe. David was previously recognized by AACE as a Fellow (2015).

Outstanding SIG Chair
This award is given by the Technical Board to recognize outstanding performance as a Special Interest Group (SIG) Chair.

Anthony M. Woodrich, CCP –
Tony joined AACE in 1996 where he has also been a member of the Great Lakes Section. He became a Certified Cost Professional (CCP) in 1997. He has been the Co-Chair of the Utilities/Energy SIG since 2014. He has been a frequent technical paper author and presenter at AACE conferences. He has served as an instructor and trainer in a variety of courses for his company. He is President of the Microsoft Project User’s Group – Detroit Chapter. Tony is a Vice President at Administrative Controls Management, Inc. (ACM). He was previously recognized by AACE as the Outstanding SIG Chair (2016, 2017).

Outstanding Technical Subcommittee Chair
This award is given by the Technical Board to recognize outstanding performance as a Technical Subcommittee Chair.

James E. Arrow, DRMP –
James joined AACE in 2011. He was an active member of the DRMP Task Force that is developing the specialty certification and was grandfathered in as a Decision & Risk Management Professional (DRMP) in 2013. He is the current chair of the Decision & Risk Management Technical Subcommittee. He is also active with the Houston Gulf Coast Section where he serves as a member on their board. James is a Lead Associate for Booz Allen Hamilton.

Jeffrey Milo, PSP –
Jeffrey joined AACE in 2008 and obtained the Planning & Scheduling Professional (PSP) in 2005. He has been very active with the Planning & Scheduling Technical Subcommittee for several years serving as a member, co-chair, and as the current chair. Jeffrey is a Senior Planner/Scheduler at Brasfield & Gorrie, LLC.
Technical Excellence

This award is given by the Technical Board to recognize outstanding technical contributions to AACE by an individual in the project and cost management community. Technical excellence may be accomplished through significant achievement or contribution to technical division work or administration and by playing an instrumental part in the development of technical products.

Dr. Maryam Mirhadi Fard, PSP – Maryam earned the Planning & Scheduling Professional (PSP) designation in 2015. She has been the primary contributor on three recently published Recommended Practices (89R-16: Management Summary Schedule, 91R-16: Schedule Development, and 92R-17: Analyzing Near-Critical Paths). Maryam is a faculty member at the Colorado State University – Global Campus and is the CEO of Adroit Consultants, LLC.

John P. Orr, PSP – John became a member in 2006 and earned his Planning & Scheduling Professional (PSP) designation that same year. He has been a member of the Technical Board since 2012. John has been active with the North Florida Section serving most notably as president for five consecutive terms (2013-2018). He is a Senior Scheduling Engineer at AECOM.

Charles V. Keane Distinguished Service Award

This award is presented by AACE to a member of a section who has contributed to the growth and development of section activities.

John L. Haynes, PSP FAACE – John joined AACE in 2002 and became a Planning & Scheduling Professional (PSP) in 2005. He has been very active with the San Francisco Bay Area Section serving in a variety of roles, most notably as president (2005-2008) and as the Executive Director of the Western Winter Workshop (2010-2018). John served on AACE International’s Board of Directors as Director-Region 6 (2011-2012; 2013-2015). He is a Senior Vice President at WSP. John was previously recognized by AACE as a Fellow (2017).

Devdas K. Tamboli, CCP PSP – Dev joined AACE in 2010. He earned the designations of Certified Cost Professional (CCP) in 2011 and Planning & Scheduling Professional (PSP) in 2012. He has been very active with the Qatar Section serving two terms as president (2015-2017). He has also served as the chair of AACE’s Center for Mentoring Excellence Committee. He was elected to serve as Director – Region 7 on AACE’s Membership Board in the most recent general election. Dev is a Projects Monitor at Qatar General Electricity & Water Corporation.

TCM Excellence Award

This award is presented by the Board of Directors to recognize exemplary current service and contributions to AACE International.

Feng Shen, PSP – Feng joined AACE in 2006 and earned the Planning & Scheduling Professional (PSP) designation in 2009. He has served on China Task Force and as president of the China Section since 2012. Feng is a Director of International Marketing at Jianke Engineering Consulting.
**O.T. Zimmerman Founder’s Award**

Formerly the Award of Recognition, this award is presented by the Board of Directors to recognize significant service of an exceptional nature to AACE International.

**Joseph W. Wallwork, PE CCP CFCC PSP FAACE** – Joe became a member of AACE in 1995. He became a Certified Cost Professional (CCP) in 1996, a Certified Forensic Claims Consultant (CFCC) in 2008, and a Planning & Scheduling Professional (PSP) in 2006. Joe has been very active with the Metro New York and Long Island Sections serving in leadership positions for both. He served AACE as a member of the Board of Directors as Director-Region 2 (2000-2002), Vice President-Regions (2002-2004), and Vice President-Finance (2014-2016). Joe has also served on a variety of AACE committees and boards including the Technical Board (2004-2006) including one year as chair, the Marketing Committee, and is currently serving as Chair of the Ethics Committee (2017-present). He is a Managing Director at Nautilus Consulting, LLC. Joe has previously been recognized by AACE as a Fellow (2012).

**Fellows**

The Board of Directors has approved these Fellows of AACE International. The membership grade of Fellow is a selective and prestigious honor for the recipients. Approval of Fellow is in recognition of professional attainment and significant accomplishment in cost management or cost engineering.

**Jeffery J. Borowicz, CCP CEP PSP FAACE** – Jeff joined AACE in 1989. He became a Certified Cost Professional (CCP) in 2006, a Certified Estimating Professional (CEP) in 2010, and Planning & Scheduling Professional (PSP) in 2006. Jeff began serving on AACE’s Technical Board in 2009 and is the Co-Director of Recommended Practices. He has served on local AACE Section board in the Great Lakes, Northern Florida (Orlando), and National Capital (Northern Virginia) Sections. Jeff has served on several of AACE’s SIGs and Technical Committees including the Building Information Modeling (BIM) Committee. He is a Manager EPC Chief Cost Estimator at Consumers Energy. Jeff has previously been recognized with the Technical Excellence Award (2009) and the Outstanding SIG Chair (2011, 2012, 2013, and 2015).

**Philips Tharakan Mulackal, CCP EVP FAACE** – Philips joined AACE in 2005. He became a Certified Cost Professional (CCP) in 2006 and an Earned Value Professional (EVP) in 2010. Philips has been very active with his local sections, Arabian Gulf and United Arab Emirates serving both in leadership positions. He has served AACE on the India Regional Task Force, the Marketing Committee, and the ITCM Conference Committee. Philips has been elected to and served on AACE’s Board of Directors as Director-Region 7 (2010-2012) and Vice President Regions – International (2015-2017). He is a Regional Quality Manager for Johnson Controls. Philips has previously been recognized by AACE as Outstanding Regional Director (2011) and TCM Excellence Award (2010).

**Julie K. Owen, CCP PSP FAACE** – Julie joined AACE in 1994. She obtained the designations of Certified Cost Professional (CCP) in 2006 and Planning & Scheduling Professional (PSP) in 2007. She has been very active with the Southern California Section serving in a variety of leadership positions. Julie has also been a frequent presenter at AACE’s Conference and other events, including serving as an instructor for the PSP Certification Preparation course. She has been elected to and served on AACE’s Board of Directors as Director-Region 6 (2009-2010), Vice President-Regions (2010-2014), President-Elect (2015-2015), President (2015-2016), and Past President (2016-2017). Julie is a Deputy Executive Officer, Program Management, Program Control at the Los Angeles County Metropolitan Transportation Authority.

**Honorary Life Membership**

Honorary Life Membership is given only upon the unanimous approval of the Board of Directors to those who have served AACE International on local and association levels in many capacities for a minimum of 15 consecutive years.

Award of Merit

The Award of Merit is given for outstanding contribution or service to the cost management or cost engineering profession, or to the public as a whole.

James G. Zack, Jr. CFCC FAACE Hon. Life – Jim joined AACE in 1986. He has been active with the Southern California Section serving in a variety of leadership positions within the section. He served on the Technical Board prior to being elected to and serving in leadership positions on AACE’s Board of Directors: Director, Region 6 (2001-2003), Vice President-T/E/C (2003-2005), President-Elect (2005-2006), President (2006-2007), and Past President (2007-2008). Jim has served as a member of AACE’s Education Board (2008-present). He is a prolific author and presenter of technical papers, webinars, and continuing education seminars – having presented all over the globe. He is also an author or contributor to several AACE’s Recommended Practices and Professional Practice Guides. He is an Executive Director at Navigant Construction Forum. Jim has previously been recognized by the AACE with the Outstanding SIG Chair Award (2000), Outstanding Regional Director Award (2002), Fellow (2009), and Honorary Life Membership (2014).

Industrial Appreciation Award

The Industrial Appreciation Award is presented to firms that have rendered exceptional support to the cost engineering profession and to AACE International’s aims and objectives.

Los Angeles County Metropolitan Transportation Authority – LA Metro is unique among transportation agencies in the United States. They serve as transportation planner and coordinator, designer, builder, and operator for one of the largest and most populous counties in the US. More than 9.6 million people – nearly one-third of the state of California’s residents who live, work, and “play” within LA Metro’s 1,433 square-mile service area. LA Metro services 15,967 bus stops with 2,438 buses in its fleet covering 170 bus routes. The Metro rail as 105 total miles of service in 4 light rail and 2 subway lines with 93 stations.

Lifetime Achievement Award

The Lifetime Achievement Award is presented by the Board of Directors to recognize individuals who have served AACE International on multiple occasions as an elected member of the Board of Directors or an active member of an Associate Board and has received any of the following: The Award of Merit, Brian D. Dunfield Educational Service Award, Charles V. Keane Distinguished Service Award, O.T. Zimmerman Founder’s Award, or the TCM Excellence Award. The individual must also have continued to serve AACE beyond receiving one or more of those awards.

John K. Hollmann, PE CCE CEP DRMP FAACE Hon. Life – John joined AACE in 1986. He became a Certified Cost Professional (CCP) in 1994, a Certified Estimating Professional (CEP) in 2008, and a Decision & Risk Management Professional (DRMP) in 2013. Through his work on the task forces that developed both the CEP and DRMP certifications, he was grandfathered into both designations. John has been a frequent presenter of technical presentations at AACE’s conferences and other events. He has also served as an instructor in a variety of continuing education courses. He was the principal author of the first edition of AACE’s 2006 landmark publication “The Total Cost Management Framework: An Integrated Approach to Portfolio, Program, and Project Management.” John authored the publication “Project Risk Quantification: A Practitioners Guide to Realistic Cost and Schedule Risk Management” in 2016. He has served AACE in various roles including chairs of the Parametric Estimating Technical Subcommittee (1993-1996) and the Online Services Committee (1994-1996). He was elected to and served on AACE’s Board of Directors for one year (1996-1997) where he was instrumental in the reorganization of the Board of Directors to create the third of AACE’s Associate Boards, the Technical Board. John was a member of the Technical Board for several years where he served as Director of Recommended Practices and Director of Total Cost Management. He is the Owner/Principal Consultant at Validation Estimating, LLC. John has previously been recognized by AACE with the Outstanding Technical Committee Chair Award (1994, 1996), the TCM Excellence Award (1995), O.T. Zimmerman Founder’s Award (2005), Fellow (2008), Award of Merit (2008), Technical Excellence (2010), and Honorary Life Membership (2011).
ARIZONA SECTION
The Arizona Section’s April technical meeting was on April 12 at Burns & McDonnell’s offices in Phoenix, AZ. The presentation was entitled, “The Importance of Construction Sequencing and Methodology for Solar Field and Battery Storage Projects,” and was given by Daniel Clark, PE; and Torrey Graf, PE, from Burns & McDonnell. The two electrical engineers provided detailed information on solar field layout, showing the magnitude of the fields and their technical capabilities, as well as construction sequencing and the major role it plays in construction and costs. They also provided the group with sample projects for solar fields and battery storage, and lessons learned in construction and sequencing. The session was very interactive, and the group found it very engaging and informative. Thanks to Daniel and Torrey for an excellent presentation! Attendees included Peng Yue, Yudhvir Saharan, Charlene Mendoza, Steve Vergara, Shana Solomon, Jesse Zunke, Greg Cutler, Robin Kankerwal, Hemant Mittal, Bill Kuck, Anish Talathi, Blake Hyte and Ruben Morales, with Marv Carson joining via teleconference.

Above: Speakers Daniel Clark and Torrey Graf are shown above presenting to Arizona Section attendees and remote attendees at the Section’s April technical meeting. The presentation was titled, “The Importance of Construction Sequencing and Methodology for Solar Field and Battery Storage Projects.”
Above: At the April Arizona Section meeting, shown above from left to right are: Arizona Section Director Programming, Shana Solomon; speaker Daniel Clark, PE; speaker Torrey Graf, PE; and Section President, Charlene Mendoza. Clark and Graf are electrical engineers with Burns & McDonnell and gave an interactive presentation to section attendees.

GREECE SECTION
The Greece Section in May hosted its first Total Cost Management Conference. The conference was at the Golden Age Hotel. The conference featured 10 unique, experienced speakers, who were representatives from well-known companies. Attendees learned about cost estimating and project management as well as receiving insights and different perspectives from industry leaders, software company executives, project portfolio managers, and academic professors. All the brightest minds gathered at the conference to help businesses work smarter and easier. For more information visit: http://www.aacegreece.com/

Above: At the Greece Section Total Cost Management Conference in May, Tolis Chatzismeen, Section President, above left, presents Iwonka Bogucka, CEO of ISETIA, above right, with a memento of her participation in the first section conference.

Left: Attendees listen to opening remarks from Section Vice President Tarek Desir at the Greece Section’s first Total Cost Management Conference in May at the Golden Age Hotel.
HAWAII SECTION

Fifteen members and guests of the Hawaii Section assembled for lunch at the office of J. Uno & Associates in April to view the webinar, “The Planning fallacy and its Effect on Realistic Project Schedules” presented by Jeffrey Valdahl and Shannon A. Katt. This webinar from 2015 brought to light the many ways in which we consciously and unconsciously place our own biases on the planning process which leads many times to the creation of unrealistic schedules. New member, Anas Nasr, PE PSP, joined us and won the door prize!

SAN FRANCISCO SECTION

On May 23, at Barebottle Brewery, the San Francisco Section conducted its last meeting before the International Conference and Expo. This social event was well attended by leadership, including AACE President-Elect Dr. Alexia Nalewaik, Region 6 Director Mark Von Leffern, and five past presidents of the San Francisco Section: John Blodgett, Lauren Farris, Roger Nelson, Jelena Djurovic, and Ben Solinsky. The first order of business was to honor the 2018 San Francisco Section Scholarship award winners. The Section’s Education Committee really had some tough choices to make in selecting three top students from the pool of applicants. Nour Bouhou led the Committee and the effort, working closely with Professor Fadi Castronovo, Ph.D., developing the criteria for determining winners and promoting the competition for the awards. These students are absolutely delighted and we had a chance to meet them in person at the May social event. The section’s 2018 scholarship winners are: Christopher Slater, undergraduate first prize of $1500; Ruby Truongtran, graduate first prize of $1,500; and Hatem Al-Smadi, graduate second prize of $1000. Helping to make this all possible, Don McNatty generously donated $2000 of funding to create these scholarship awards. Don has been a longtime supporter of AACE for over 25 years. The Board of San Francisco Section greatly

(continued)
appreciates the financial contribution from DRMcNatty & Associates. We have seen in the students’ responses how much this means to them and the positive impact it will have on their educational goals. Next item on the agenda was to welcome and congratulate the incoming 2018-19 section board members! A healthy mix of proven talent and new faces took the helm in leading San Francisco Section. Membership wished them the best of luck and much success! Attendees were excited to meet the new board members at the May social event. Section officers are: Ankit Desai, President; Nour Bouhou, Vice President; Karolina Athanasopoulou, Treasurer; and Sarah Grossman, Secretary.

Above: San Francisco Section Scholarship Winners were honored at the section’s May meeting. Shown above (left to right) are: Ben Solinsky, Past President San Francisco Section; Christopher Slater, Undergraduate Scholarship First Prize; Hatem Al-Smadi, Graduate Scholarship Second Prize; Professor Fadi Castronovo PhD., Education Committee Member; Nour Bouhou PhD., Education Committee Chair; Ruby Truongtran, Graduate Scholarship First Prize’ and Ankit Desai, President San Francisco Section. At Right: San Francisco Section Officers for 2018-2019 are (shown above left to right): Nour Bouhou, Vice President; Sarah Grossman, Secretary; Ankit Desai, President; and Karolina Athanasopoulou, Treasurer.

SOUTHERN CALIFORNIA SECTION
On May 23, the Southern California Section had Brook Bolger Stephenson, Regional Vice President AEGIS Project Controls, discussed project schedules; ‘No Date Left Behind, Using the Data You Already Have in Your Schedule’. Explaining how project schedules contains an abundance of data, most of which goes unused, Brook reviewed key performance indicators that help provide more accurate information about the status, health, and problem areas of a project. Next year’s section board members were also introduced. There were 26 in attendance.

Above: At the May 23 Southern California Section meeting, Brook Bolger Stephenson, Regional Vice President AEGIS Project Controls, receives a speaker’s gift from Section president Phil Peterson.

DOES YOUR SECTION HAVE NEWS TO SHARE? See below for complete instructions for how to submit news and photos from your Section’s happenings to be included in the AACE® International Bulletin.

SUBMITTING SECTION NEWS  We invite all sections to submit news and updates to be included in the International Bulletin section of each Source issue. Please submit any and all text as a part of the e-mail or as a Microsoft Word file attachment. Please submit any photos as individual attachments in JPG formats. Do not embed photos in Microsoft Word files. For photos to be used, we require either large original files or print size photos at 300 dpi (dots per inch). For photos to be published, they must be in focus, of print quality, and of sufficient resolution.

Please include the names and titles of each person shown in any photos. Please list names from left to right or refer to those shown as being above left or right. For group photos please list names from left to right, beginning with the front row and working to the back. All submissions should be e-mailed to editor@aacei.org. Please use the official name of the Section as approved by the AACE Board when the Section’s charter was approved. Within 2 to 3 business days of submitting a “Section News” items, you should receive a return confirmation e-mail that your submission was received at AACE headquarters.

MISSING SUBMISSIONS Generally, all submissions received in the above scheduled times will be published in the listed issue. Items are not held because of space restrictions. There is no waiting list and no preference is given to one Section over another. Questions about incomplete submissions or failure to follow these submission guidelines could delay publication. Text will be published without submitted photos if the photo does not meet the listed quality requirements. AACE reserves the right to edit all submissions and/or to refuse to publish any submissions determined by the Managing Editor or the Art Director to not meet the standards of the journal. Any appeals of these decisions will have a final decision determined by the Executive Director.

If a submission is not included in the designated issue, please e-mail or call the Managing Editor to ensure that it has not been lost or misplaced. Call or e-mail if you do not receive a confirmation e-mail within 3 business days of submission.

Source has a submission deadline of two months in advance of the issue date.

Submission Dates Publication Date
By Dec. 31 February
By Feb. 28 April
By April 30 June
By June 30 August
By Aug. 31 October
By Oct. 31 December

Any Section representative with questions is advised to e-mail editor@aacei.org or call the Managing Editor during regular business hours, 9 a.m. to 5 p.m. Eastern Standard Time, Monday-Friday, except holidays and special closings.
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**SEPTEMBER**

20  CMAA BREAKFAST OF CHAMPIONS  
    Community College Districts Updates  
    Riverside Marriott, Riverside, CA  
    www.cmaasc.org

20  SEAOI TRADE SHOW AND SYMPOSIUM  
    Hotel and Conference Center  
    1900 S. 1st St., Champaign, IL  
    seaoi.org/event/central-chapter-trade-show-and-symposium-2018

23-26  THE 7TH IBPC INTERNATIONAL BUILDING PHYSICS CONFERENCE  
    Syracuse University  
    ibpc2018.org

**OCTOBER**

12-15  ASCE CONVENTION  
    Hyatt Regency at Colorado Convention Center, Denver, CO  
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**DECEMBER**

3-5  FOURTH AUSTRALASIA AND SOUTHEAST ASIA STRUCTURAL ENGINEERING AND CONSTRUCTION CONFERENCE  
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**2019**

**MAY**

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