Inside:

President’s Message 5
Notes from the Chair 6
On Being a Consultant 7
Where Did You Learn About Ethics? 9
COVER: Reviving the Rapps Dam Road Bridge 10
Election Results for PSPE 2013-14 State Office 13
District 3-0 Milestone 14
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Features & Columns

President’s Message ................................................................. 5
Notes from the Chair ............................................................... 6
On Being a Consultant ............................................................ 7
Membership Benefits ............................................................... 9
Reviving the Rapps Dam Road Bridge ................................. 10
Election Results for PSPE 2013-14 State Office .................... 13
District 3-0 Milestone ............................................................. 14
PAC Sponsor Recognition ..................................................... 16

Advertisers

East Coast Erosion Blankets LLC ............................................. 5
Michael Baker Corporation ...................................................... 2
New Enterprise Stone & Lime Co. Inc. ................................. 5
Newton Engineering ............................................................. 7
R. Peruzzi Consulting, Inc ....................................................... 7

NSPE Code of Ethics for Engineers

Engineers’ Creed

As a Professional Engineer, I dedicate my professional knowledge and skill to the advancement and betterment of human welfare. I pledge:
To give the utmost of performance;
To participate in none but honest enterprise;
To live and work according to the laws of man and the highest standards of professional conduct;
To place service before profit, the honor and standing of the profession before personal advantage, and the public welfare above all other considerations.
In humility and with need for Divine Guidance, I make this pledge.

Adopted by National Society of Professional Engineers, June 1954
President’s Message
Michel J. Sadaka, P.E., F.NSPE
PSPE President 2012-13

It is hard to believe, but this PSPE administrative year is over. I am looking forward to a successful 2013 Annual Conference and to welcoming most of you to the conference. In this report, I will attempt to summarize some of the highlights of events during the last administrative year, both at the State and the National Levels.

State Level Highlights
Legislative Action: PSPE was the lead organization for this year’s legislative day in Harrisburg, and by comparison to previous years, a success. On April 9, 2013, about 60 to 80 Engineers & Surveyors visited the State Capital, had lunch with the legislators (the ones that showed up) and visited the legislative offices to address several issues important to the profession.

The issues we presented to the legislators included topics such as transportation funding, MathCounts funding (see update below), Right of Entry (for survey purposes), & Municipalities’ planning code regarding consultant compensation, and updates to the Engineer’s Registration Act.

Since the legislative day, the Engineer’s Registration Act updates, approved unanimously by the PSPE Board during the Jan 2013 meeting, have been introduced in House Bill 1447.

HB1447 is now in the hands of the Commonwealth House Committee on Professional Licensure for review. Once the Pennsylvania House is back into session, after their summer break, we hope that we can get some action on this bill.

Part of the updates to the Engineer’s Registration ACT proposed in HB 1447 deals with Electronic Seals. Independent of our legislative efforts, the Pennsylvania State Registration Board had developed Electronic Seal Regulation Draft; 16A-4713 – Electronic Seals. If you are interested in this topic, please contact PSPE Office for a copy of this draft regulation.

Continuing Education: As you are all aware, 2013 is a License renewal year for Pennsylvania Licensed Engineers. PSPE conducted two “boot” camps providing CE opportunities to members and non-members across the Commonwealth. Both the East and West Boot camps were well received and attended.

During the Annual PSPE Conference, we are offering two days of CE sessions for the benefit of all members, especially the ones still in need of credits for License renewal. September 30, 2013 is the deadline!!

MathCounts: The State MathCounts competition was held this year March 22 & 23 and was successful. Attendees enjoyed the competition and Pennsylvania sent a team of 4 talented Mathletes to the National MathCounts competition in Washington, D.C.

Pennsylvania’s Mathcounts team came in 13th at the National competition and we had two Mathletes from PA in the top 50 overall. Yogeshwar Velingker came in at 18th place and John Michael Wu at the 50th. Congratulations to Pennsylvania on the good showing at the National MathCounts Competition.

And for you members following the status of MathCounts funding and finances, you will be glad to hear that the State Competition finances have been stabilized and the competition had a surplus of about $10,000.

In addition, funding to support MATHCOUNTS in the Commonwealth budget reappeared as part of the PA Department of Education’s appropriation. The recently enacted state budget included $50,000 to support the math program. A special thanks to all PSPE members who continue to support MathCounts.

“Message” continued pg. 5
National Level Highlights

NSPE is returning to member centric (focused) approach, and is working to develop a National 3 tier membership marketing in all States. Since the annual NSPE Conference (July 2013) NSPE completed the development of a “flyer” and a mailing to 28,000 engineers (non-members).

In keeping with the “electronic age” NSPE now has developed a mobil application for the www.NSPE.org website.

One of the encouraging aspects of the vision outlined by NSPE’s new Executive Director, Mark Golden, is the effort to move away from the term 3 tier membership system, and focus on a new lateral hierarchy. The goal is to convert the current hierarchical National / State / Chapter dynamic into a system of equals, fully integrated and interdependent. We are one organization for Professional Engineers and not 3.

NSPE’s leadership appears fully committed to implementing and strengthening the partnership among all the Society’s components.

Working on establishing a collaboration system/platform to make the continuing education sessions presented in the various states available to all NSPE members. One of the approaches being considered is a system of sharing sessions similar in concept to itunes.

I was encouraged and energized by the efforts of the NSPE Leadership, and I would encourage all our members to take a look at what is happening at the National level.

The next NSPE Conference is going to be held within a comfortable driving distance from most of Pennsylvania, in Washington DC during the first week of July 2014.

If you have not attended an NSPE conference, 2014 is a good time to do so, and as an added bonus you can be there to support a PSPE member and Past PSPE President, Harve Hnatiuk, who is going to be installed as the NSPE President. Congratulations Harve!
Notes from the Chair

Eric Tappert, PE
PSPE Communications Committee Chair

Welcome to the PE Reporter, the publication for professional engineers in Pennsylvania. This year we’ve enhanced the publication to help satisfy your reading pleasure in several ways:

1. There is a new column on membership benefits. Each issue we will describe another benefit of your membership, in the hopes of keeping you informed and enhancing your professional life.

2. Another new feature is the “View from the Window” series of opinion pieces by members with long and meritorious experience (aka, “old geezers” :>). Hopefully this will help generate discussion of issues facing the engineering community.

3. So that you can respond, we will be publishing “Letters to the Editor”. Commentary on current issues or PE Reporter articles/columns is invited. Conciseness would be appreciated and we reserve the right to edit and/or refrain from publishing inappropriate responses.

4. Feel free to share the PE Reporter and/or portions thereof with your co-workers. Naturally we will continue to include all the Society news and feature articles as always.

Enjoy.

“A well adjusted person is one who makes the same mistake twice without getting nervous.”
~Alexander Hamilton

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On Being a Consultant
Alfred Gruenke, PE

Consultants are an essential part of conducting a business. Many client requirements are beyond the capabilities of their in-house personnel, even if the skill and experience level is relatively high. Plant personnel may have twenty years experience at a process, but this experience might be one year’s experience repeated twenty times! The outside consultant has a definite advantage, since this experience is often the result of visiting many companies over many years. The good consultant will learn something on each assignment, which adds to his repertoire and his skill level for the next assignment.

A consultant has been described as someone who comes to your plant, borrows your watch, then charges you thousands of dollars to tell you what time it is. The information necessary to find the solution is often known to the client, but he is not capable of sorting the information into a logical pattern and find the solution.

As a corollary to the above, the quality of the expertise the consultant provides is proportional to a constant (of course) times the distance the consultant is away from home, squared.

When first meeting the client, ask questions as to what the problem is, how the equipment reacts to changes, and what they have checked themselves. This is important. The client has operated the machinery for a long time, and has probably tried multiple solutions, all to no avail. Don’t restrict your interaction with plant management. Instead, talk to people lower on the totem pole. In many cultures, ordinary employees are not allowed to offer opinions to their bosses, but are willing to talk to outsiders if, for no other reason, to give the management some comeuppance. Walk around during slack periods such as lunch time or later shifts to reduce the front-office influence. In foreign countries, take advantage of the fact that people want to talk to you merely to show off their knowledge of English.

Offer possible solutions, a list of what you are going to check. It makes the client feel that you are prepared. Don’t be dismayed by snickers or open guffaws at some of your proffered solutions. Explain that this is a long shot, but you’re not going to leave any stone unturned. I once told a client that I was going to check the bucket elevator head shaft speed. Their reaction was not intended to lift my self esteem! As it turned out, someone had increased the elevator speed a few years earlier in a mistaken attempt to increase the capacity, but in doing so exceeded the critical speed of the elevator so that it was no longer a centrifugal discharge. A portion of the cement stayed in the bucket, and dumped it back down into the boot. Capacity was reduced.

Be prepared to question the original engineering and installation. A few years ago a cement company in the Philippines had severe production problems. A cement grinding circuit separator had been installed by a Japanese company ten years previously, but had not worked as intended. Instead, talk to people lower on the totem pole. In many cultures, ordinary employees are not allowed to offer opinions to their bosses, but are willing to talk to outsiders if, for no other reason, to give the management some comeuppance. Walk around during slack periods such as lunch time or later shifts to reduce the front-office influence. In foreign countries, take advantage of the fact that people want to talk to you merely to show off their knowledge of English.

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Be prepared to question the original engineering and installation. A few years ago a cement company in the Philippines had severe production problems. A cement grinding circuit separator had been installed by a Japanese company ten years previously, but had not worked as intended.

“Consultant” continued pg. 8
never met the anticipated production. My company now manufactured and sold the same separator, so I was assigned to analyze the system.

A quick word on the cement grinding process. Clinker and gypsum are fed into a rotating ball mill. The mill discharges into a bucket elevator which lifts the cement and feeds the separator. The separator is similar to a squirrel cage fan, rotating about the vertical axis. Air transports the smaller cement particles through the fan and out of the system. The faster the rotation, the finer the product size. Oversize particles fall down into a cone, through a tipping valve, and back to the mill for further grinding.

Before going to the site, I met with the client’s management for a long meeting where the operation and an array of things to check were discussed. Among other things, I was told that if the feed rate was increased, the separator power would increase and trip out on overload. This is virtually impossible, unless the feed backed up in the discharge cone. I had a good clue before I left the meeting.

One look at the separator and I had the solution. The discharge tipping valve was too small, about 1/10th the normal size. The feed was backing up, and interfering with the rotating cage.

At this point, be careful. If the problem is identified immediately, a lot of people will feel bad. It’s better to include this in your list of things to do, and stretch out the proceedings. You can’t travel 10,000 miles to fix a problem that had been ongoing for years, and spend less than one day to fix it! So, I spent a week checking the dust collector cleaning cycle, fan wheel to inlet cone gap, elevator buckets, plus a myriad of other stuff. It was all for show. I knew what the problem was.

The customer bought a new valve and installed it. Production immediately increased, but there was obviously a learning curve to take full advantage of the new conditions. Full capacity was achieved within a month.

Trumpets flared and young maidens threw rose petals as I walked out the door, or so I imagined. However, I’m sure that the client was smiling when he signed the check. After all, isn’t this your purpose for being a consultant in the first place?
Ask any engineer if they act ethically all the time and you will get a resounding “YES”. It is human nature to imagine ourselves as ethical beings, but do we really know what that means? All of us experience some ethical quandary sometime during our career and as often as not, we take a quick glance at the code of ethics and “shoot from the hip”. Usually it works just fine, but sooner or later we’ll discover a situation that has different portions of the code coming together in a conflicting fashion, giving different results. Those are the interesting cases and way too often we are ill prepared to deal with them.

Ethics are based on societal moral values, often taught to us at a young age by mom and dad. If we are lucky we had some formal instruction and know about the various frameworks like utilitarianism, deitism, rights ethics, duty ethics, and even ethical egoism (which forms the basis of our capitalistic economy). Why so many frameworks? Simple, the moral values of society can be analyzed in different ways, leading to different results. So, where does that leave us? We have a code of ethics that may yield conflicting results in some situations that can analyzed with different moral frameworks that also lead to conflicting conclusions.

What we need is some down to earth examples that actually correspond to real life. Couple those situations with an expert analysis based on the code of ethics, with the canons properly prioritized, and we have some decent material to help us out.

Case studies in ethics are a popular item at PSPE continuing education conferences, and are a good source of information. More diversity, however, can be found in the National Society of Professional Engineers Board of Ethical Review cases. These are real life cases (as Jack Webb would put it: “the names have been changed to protect the innocent”) analyzed in detail with regard to the NSPE code of ethics. Every issue of PE Magazine has a new case and archive of the last 65 years worth of cases is available on-line at http://www.nspe.org/Ethics/EthicsResources/BER/index.html. The titles are pretty self explanatory, so it’s relatively easy to find a situation similar to your current dilemma.

I happen to teach a course that deals with ethics to engineering and engineering technology students and can attest to the value of these cases. They also make dandy test questions… At a minimum every professional engineer should read the ethics column in PE Magazine every month. Remember to look at the archived cases if something comes up in your practice that looks a little confusing.

Another great membership benefit brought to you by your membership dues.

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**Engineers’ Creed**

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In humility and with need for Divine Guidance, I make this pledge.

Adopted by National Society of Professional Engineers, June 1954
Reviving the Rapps Dam Road Bridge
Jennifer Reigle, PE

The Rapps Dam Road covered bridge is a wooden Burr Arch Truss with a span of 106 feet located in East Pikeland Township, Chester County, PA. The bridge was originally built by Benjamin F. Hartman in 1868 and is listed in the National Register of Historic Places. The bridge is currently owned by the Pennsylvania Department of Transportation (PennDOT) and conveys SR 1049, Section CRF, over French Creek. In 1977, PennDOT replaced the original horizontal transverse floor beams with a steel beam superstructure, which removed the traffic loads from the wooden Burr Arch Truss, thereby increasing the load carrying capacity of the bridge.

More than 30 years have passed since that rehabilitation. Time and use have taken their toll on the bridge components, resulting in deterioration of wood members, steel beam superstructure, and stone masonry abutments. In May 2006, PennDOT Engineering District 6-0 partnered with Pennoni to design bridge improvements that would extend its service life while retaining its historic appearance and character. Pennoni served as the prime consultant for the project team and employed its bridge engineering staff to design the improvements.

**Original or Innovative Application of New or Existing Techniques**

To stabilize existing stone masonry abutments and safely support the new steel superstructure, a reinforced concrete jacket was constructed over the back face of each abutment. Placing the reinforced concrete jackets on the back face of the abutments hides them from view as they are covered by the approach roadways.

Placement of reinforced concrete jackets to stabilize existing stone masonry abutments is a well-established technique for increasing the life of existing abutments, and increasing the load those abutments can support. Typically, jackets are placed on the front of the abutment, altering the appearance of the
abutment and the entire bridge. Placing jackets behind the abutment and under the roadway to preserve the appearance of the stone masonry abutments, while not original, is a less common technique that was used on this rehabilitation and met PennDOT’s project goals. With stabilizing jackets supporting the superstructure and carrying the bridge loads, the original stone masonry abutments and wingwalls needed only minor repointing in select areas to increase their life and to maintain their original appearance.

In addition to the stabilizing jackets behind the abutments, Pennoni engineered the removal and replacement of the steel beam superstructure installed in 1977. The purpose of the steel beam superstructure was to remove the traffic loads from the wooden Burr Arch Truss and increase the load carrying capacity of the bridge.

That limited capacity steel beam superstructure was replaced with a new steel plate girder superstructure capable of supporting modern traffic loads. It is concealed by the redwood siding and not visible in elevation, thereby preserving the historic character of the bridge. In addition, this new superstructure minimizes traffic loads on the original Burr Arch Truss, thus preserving it.

**Future Value to the Engineering Profession**

Balancing form and function is important to a project like the Rapps Dam Road Bridge rehabilitation. The bridge must support modern traffic loads if it is to continue as a functional part of the public roadway network. Vehicles are becoming heavier, tend to move faster, and traffic volumes are increasing. Contemporary bridge engineering has the tools, techniques, and materials to build new bridges that meet these challenges. Bridges like the Rapps Dam Road Bridge, which had become functionally obsolete, have cultural value beyond their function. The goal is to preserve, as much as possible, that cultural value while improving the bridge’s function to modern standards.

“Rapps Dam” continued pg. 12
The Rapps Dam Road Bridge has essentially merged two bridges into one, combining the simple elegance of the design and construction methods of the era of its origin, with the functionality of modern design, materials, and construction. The bridge is now a window to the changes in bridge engineering across its life span. But more than that, the bridge shows the creativity of the engineering profession by combining the old and new into an elegant and functional component of the public transportation system.

**Social, Economic, and Sustainable Design Considerations**

The social design considerations for this project are focused primarily on preserving the historicity of the bridge. Preserving old covered bridges like this one contributes to preserving the legacy of the rural culture of Pennsylvania. Wood features of the bridge, including the cedar shake roof, roof sheathing, redwood siding and trim, floor planks, decking, and curbs, were completely removed and replaced in-kind. Selected wood framing members, including roof rafters, ceiling joists, knee bracing and siding studs, were replaced in-kind as well. The new steel superstructure, necessary for supporting modern traffic loads, is concealed by the redwood siding and not visible in elevation.

The economic and sustainable design considerations for this project are represented primarily by the newly installed high strength steel superstructure capable of safely supporting modern traffic loads, which significantly improved the local transportation system. This now full functioning historic transportation landmark will serve the community and enrich the lives of those who see and cross it for many years to come.

**Complexity**

During the design process, the project was discussed and coordinated with local stakeholders to ensure that the recommended design considerations were the best approach for the project’s social and cultural context. Further, the bridge is listed on the National Register of Historic Places, so approval by the Pennsylvania Historical and Museum Commission (PHMC) was sought and granted. During construction, the bridge was closed and traffic was rerouted along a two-mile detour.

The original wood Burr Arch Truss was left intact during construction, which supported the bridge shell. The deteriorated steel beam superstructure that had been installed in 1977 was removed and reinforced concrete jackets were installed behind the abutments. The new steel plate girders were moved into place through the bridge portals using a roller mechanism.

After construction of the superstructure, the wood features, including the cedar shake roof, roof sheathing, redwood siding and trim were removed and replaced in-kind. Selected damaged wood framing members were replaced as well. A clear fire retardant and wood preservative was applied to the wood members and the portals were repainted. Minor roadway work was also necessary, and was limited to roadway paving, drainage and safety improvements.

**The Final Product**

At the time this project began, the Rapps Dam Road Bridge was about 140 years old and had endured more than 30 years of weather and wear since its last rehabilitation. As with similar wooden covered bridge projects in Pennsylvania, PennDOT needed to find a balance between the demands of the environmental setting, the history, and the local stakeholders for retaining as many of the characteristics of the original bridge as possible with the need to accommodate contemporary vehicular weights, speeds, and traffic volumes, while extending the life of the bridge. This project has accomplished all of those goals.

The rehabilitated bridge retains the appearance of the original bridge with a natural wood finish. The newly pointed stone masonry abutments and wingwalls also retain their original appearance. The reinforced concrete jackets that support the abutments are hidden from view, as is the steel plate girder superstructure. These structural improvements allow the bridge to operate without a load rating. A 10'-0” height restriction, due to the wooden cover, is the only limitation to traffic.

Pennoni Senior Designer Stephen Thompson also contributed to this article.
MEMORANDUM

To: Michel Sadaka, PE, F.NSPE
From: Francis J. Stanton, PE, F.NSPE, Nominating Committee Chair
Date: June 15, 2013
Subject: Election Results for PSPE State Office 2013-2014

The following PSPE members have been elected as officers for the 2013-2014 term of office:

President Elect: Eric W. Tappert, PE (Lehigh Valley Chapter)
Secretary: Steven Novotny, PE (Johnstown Chapter)
Treasurer: Peter Staffeld, PE (Lehigh Valley Chapter)
Northwest Region Vice President: Tim Ormiston, PE (Beaver County Chapter)
Southeast Region Vice President: John A. Nawn, PE, F.NSPE (Delaware Chapter)
Southwest Region Vice President: Joseph F. Boward, PE, F.NSPE (Pittsburgh Chapter)
Central Region Vice President: Keith A. Miller, PE (Central Chapter)
Northeast Region Vice President: Joseph McCarthy, PE (Lehigh Valley Chapter)
The $18 million Lance Corporal Abram L. Howard Memorial Bridge, formerly the DuBoistown Bridge, replaces the last structurally deficient river crossing in the Pennsylvania Department of Transportation’s (PennDOT’s) Engineering District 3-0. This 100-percent, federally funded project was a milestone for the district and was completed and opened for use in November 2012 after just 2.5 years of construction. The new bridge spans the West Branch of the Susquehanna River connecting DuBoistown Borough to the City of Williamsport in north central Pennsylvania.

Adjacent to and just upriver of the previous bridge, the new 12-span, continuous, composite prestressed concrete bridge carries two 12-foot lanes with 6-foot shoulders on each side and a 5-foot barrier-separated sidewalk on its downriver side. At 1,490 feet-long, the new bridge also is the longest jointless concrete bridge in District 3-0.

The Issue

The previous structure, a seven-span, steel, camelback, non-redundant truss bridge with an open-grid steel deck was considered structurally deficient. It also had inadequate load height clearance, limited sight distance, and narrow roadway width. The bridge’s confined 9-foot lanes with no shoulders were the scene of eight crashes between 1998 and 2008, including four injury crashes and one fatality. This bridge was ranked as the highest priority bridge for District 3-0 to replace based on a risk analysis.

PennDOT and the Williamsport Area Transportation Study, the region’s metropolitan planning organization, were aware of the bridge’s deficiencies and the need for its replacement, but the transportation funding annually allocated to Lycoming County could not support the project without affecting the scheduling of other transportation projects in the area for several years.

Funding

Typically, a designated amount of money from federal and state funds is provided to assist state and local governments with transportation projects each year. Federal projects are usually funded with 80 percent federal funding, and a 20 percent matching contribution is by state and local allocation. However,
“Howard Memorial Bridge” continued from 14

as a result of the Minneapolis I-35 bridge collapse in 2007, Congress approved $1 billion nationwide in federal funding for bridges classified as structurally deficient that were not included on any transportation improvement plan. The DuBoistown Bridge was eligible for this federal funding that would cover 100 percent of its replacement. This was an excellent opportunity, but the project team had to meet a short deadline to have the bridge under construction to take advantage of the federal funding.

Innovative Solutions

Gannett Fleming, from Harrisburg, Pa., provided preliminary and final design for the project, as well as the relocation of several utilities. The prime contractor was Susquehanna Supply Company from Williamsport.

The selection of an upstream alignment that was adjacent to the previous bridge reduced the time that the previous bridge would be closed to traffic during construction and allowed an easier transfer of water, sewer, gas and electric utilities to the new bridge. In addition, it avoided impacts to the existing storm water pumping station near the Williamsport sewer plant, and it had the lowest overall construction cost.

Bridge Design Challenges

Continuous, composite prestressed concrete beams were selected for the new bridge because they are economical and provide a long bridge life with low maintenance. However, the bridge’s complicated curved horizontal and vertical geometry created design and construction challenges. Limitations on the amount that the curved deck at each end of the bridge could overhang the straight beams governed the distance between piers. Beam height also was limited to keep the superstructure thin enough so flood waters can pass beneath the bridge. The need to transport beams under nearby low bridges also restricted the size of girder that could be used. Provisions for electrical conduits and a six-inch sewer line had to be detailed through the concrete diaphragms on the bridge.

Complexity

Adding to the complexity of the bridge was the desire to make it continuous for the entire length, eliminating deck joints and their inherent maintenance issues, and improving ride quality. A sophisticated computer analysis was required to predict forces on the piers and movements at the bearings as the chorded beams on the curves at each end of the bridge moved in response to temperature changes on the long structure.

The project also crossed a levee owned and maintained by the US Army Corp of Engineers (USACE) and was immediately adjacent to a stormwater pumping station associated with the levee system. Close coordination with the USACE was maintained throughout construction of the new bridge.

Innovative solutions and a spirit of cooperation among the owner, designer, and contractor to address the needs of the project and the community, along with full federal funding made it happen. The project was completed on time and opened to traffic on November 16, 2012. Its wider lanes and shoulders, together with the strength and redundancy of its composite prestressed concrete will improve safety for the 5,000 motorists who travel this bridge daily.

On April 13, 2013 the bridge was renamed in honor of Marine Lance Corporal Abram L. Howard, the first Marine from Lycoming County to be killed in Afghanistan during Operation Enduring Freedom in 2010.

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PSPE actively monitors and influences legislation which could impact the practice of engineering and the Professional Engineer’s license in Pennsylvania.

Donations to the Political Action Committee (PAC) are used toward this goal.

Thank you to the PSPE members who have so generously given to support this work.

To support the PSPE Political Action Committee in their work, send a personal check to

PSPE PAC
908 N 2nd Street
Harrisburg PA 17102