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**Pennsylvania Society of Professional Engineers Spring 2013**

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**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
Fellow Professional Engineers:

And now to update you on what has been happening with PSPE in the past couple of months…..

Since my last message, prior to Engineer’s week, the PA state MATHCOUNTS® competition, Legislative Day in Harrisburg, Boot Camp East and Boot Camp West have all been held.

The State MATHCOUNTS® competition was held this year on March 22nd & 23rd and was successful. The 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 Michael Wu at 50th. Congratulations to Pennsylvania on the good showing at the National MATHCOUNTS® Competition.

For 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. As the MATHCOUNTS® State coordinator (2011-2013), I had planned, with the unanimous approval of the State MATHCOUNTS® committee, on sharing this surplus with the Chapters to support the local competitions; unfortunately, the Pennsylvania Engineering Foundation Board voted not to do so.

Legislative day in Harrisburg was led this year by PSPE and was by comparison to previous years, a success. On April 9, 2013, about 60 to 80 Engineers and 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, Right of Entry (for survey purposes), and Municipalities’ planning code regarding consultant compensation.

Unfortunately, as far as our signature legislative issue is concerned, updating the Engineer’s Act, the draft bill that we are championing was not ready for the legislative day. Even though we now have multiple sponsors, I am told that due to the legislative “holiday” the bill has not been released. The expectation is that when the legislature returns the first week of June 2013, the bill might get a number and be introduced!

As a reminder, September 30, 2013, is the deadline to earn Continuing Education Credits for this renewal cycle. PSPE organized two “Boot Camps”: one in the East held in April and was well attended and the next one in the West in June.

If you were not able to attend either of the boot camps, you still have the opportunity to earn up to 12 PDHs prior to the renewal deadline... at the PSPE annual conference, September 18 to 21, 2013 at the Holiday Inn Harrisburg-Hershey. In addition to the education sessions, the annual conference is an excellent opportunity to connect with fellow professional engineers, network, and make friends. Watch www.pspe.org for conference details, mark your calendars and plan on attending.

NSPE’s 2013 Leader Conference & Annual Meeting is going to be held this year in Minneapolis MN, from July 17 until July 21, 2013. You can check www.NSPE.org for all the details about the NSPE event.

This will be my last message as the PSPE President in the PE Reporter; it has been my honor and pleasure to serve my fellow Pennsylvania professional engineers in this capacity, Thank you. ☀

Michel J. Sadaka, P.E., F.NSPE
PSPE President 2012-13
Burnt House Road Bridge, known locally as the Humpback Bridge, is located in Dickinson Township, approximately 30 miles outside of Harrisburg, Pennsylvania. Constructed in 1912, the bridge carries Burnt House Road, the main north-south thoroughfare in Dickinson Township, over the Yellow Breeches Creek.

At nearly 100 years old, the original single-lane bridge had reached the typical life expectancy of a concrete arch bridge. Deterioration in recent years led to decreasing load capacities. In 2007 the posted load limit of 15 tons was further reduced to three tons, which was not conducive for normal traffic, let alone nearby quarry traffic. After an underwater inspection revealed undermining of the foundations, the bridge was closed to all traffic in July of 2009.

Dickinson Township, which owns Burnt House Road, and the Pennsylvania Department of Transportation (PennDOT), the bridge owner, embarked on an evaluation process to determine if the original bridge could be rehabilitated or if it would need to be replaced altogether. Bridge engineering firm Modjeski and Masters was engaged for preliminary and final design, and faced the challenge of balancing the community’s preference to preserve the appearance of the original bridge with modern-day traffic demands.

**Context Sensitive Design Elements Ease Community Concerns**

Because of the community’s attachment to the visual aesthetic of the original bridge, context sensitive solutions were an important design consideration.
These solutions needed to both preserve the look of the original bridge, and to improve bridge functionality and safety for pedestrian and motor traffic.

The replacement bridge design is composed of a wider bridge that now accommodates two lanes of vehicle traffic with a sidewalk that facilitates safer pedestrian traffic. A new sidewalk was incorporated on the same side of the road as nearby Stuart Park – an added safety feature for park visitors and Yellow Breeches Creek fishermen alike.

The new three-barrel arch structure chosen for the replacement bridge serves a dual purpose. First, the center barrel is raised relative to the outer barrels, which maintains the humped profile that was important to the community. Second, the large opening of the center barrel improves hydraulic functionality by better accommodating stream flow and preventing an increase in backwater, which in turn reduces the risks of flooding nearby properties.

Finally, the new bridge’s stone facade was created to replicate the look of regional limestone used in the construction of nearby historic structures. Arch headwalls were fabricated using stacked stone pattern formliners to give the appearance of stone. The concrete was then stained to mimic the regional grey limestone.

Accelerated Construction Enables Compliance with Environmental Mandates

Because Burnt House Road is a primary travel route through Cumberland County, and the bridge was already closed to traffic, getting a new bridge back into operation as quickly as possible was important to PennDOT and Dickinson Township officials. Accelerated construction alternatives were evaluated, and the final designs incorporated 30-ft. pre-cast CON/SPAN arch units to streamline construction time.

The Yellow Breeches Creek is deemed a high quality, stocked and naturally producing trout stream. The Pennsylvania Fish and Boat Commission regulates in-stream construction to prevent disruptions to trout reproduction. As such, in-stream construction activities between March 1 – June 15, and October 1 – December 31 are prohibited. Because the available window for construction time is limited by these regulations, use of prefabricated arch units drastically reduced the amount of time construction teams needed in-stream access.

Asphalt Deck Reduces Future Maintenance

Use of CON/SPAN units enabled an asphalt deck versus a reinforced concrete deck. Bridge redecking typically occurs every twenty to thirty years, can be a lengthy process with a substantial price tag, and can often require substantial bridge closures. Repaving saves future costs associated with ongoing bridge maintenance, reduces traveler headaches, and improves bridge longevity. Further, PennDOT’s ultimate goal is to transfer ownership of the new bridge to Dickinson Township, so future maintenance and the bridge’s impact on the local taxpayer was an important consideration.

Improved Alignment Streamlines Traffic Flow

To facilitate traffic flow across the bridge, the project involved modifications to the horizontal alignment of Burnt House Road. Prior to the bridge replacement project, the road had a distinct “kink” immediately before the bridge on the south side. The design team incorporated a new alignment that eliminated the kink, enabling traffic to flow more freely across the bridge.

One major challenge the design team faced when creating a new alignment was working within the given right of way. Because of historic structures nearby, including a stone farmhouse, ruins from a stone barn and nearby wetlands – all of which were important historic and aesthetic components of the bridge setting – the new alignment would need to be created in a way that avoided any impacts on these elements.

Gilbert Cornwell, former Dickinson Township resident of more than fourteen years, believes he speaks for local residents when he says he is “very pleased” with the new bridge. “I have heard people talking who wanted the bridge to be shut down completely, and now they say it’s a very nice bridge. We are very pleased with the new bridge.” Township manager Laura Portillo commented that “the beauty of the bridge speaks volumes” and added that many residents comment on how great it looks; that it kept the feel of the old bridge.
One’s career choice is often influenced by pragmatism and chance. Sure, work on the Super Collider, or maybe the Deep Space Probe, would be ideal, but those dream jobs are few and far between. A significant other may have something to say about the matter, so we settle on something practical.

I suggest choosing a career in between the dream job and the practical - spend five years as a Field Engineer installing and commissioning equipment for an engineering firm and equipment manufacturer that sells its equipment worldwide. You will advise on the installation and operation of process machinery in many locales, allowing you to step into any one of a multitude of positions afterwards. Marketing, sales, proposal writing, project management, as well as engineering will be open to you.

Take the opportunity to learn, travel, and in the process, do some good in this world. This is what I did for thirty years from the middle to the end of my working career, and have never regretted my experience.

While your buddies are into the local bar scene, you could be sitting on a mountaintop in Kyrgyzstan advising on changing a grinding mill shell, chatting and drinking chai (tea) with an engineer from Russia. Which experience will be remembered in thirty years?
Within a few years you will be in a plant meeting room with the VP of Operations and the Maintenance Superintendent discussing a problem, and someone will turn to you and ask, “What do you think we should do?” In many organizations at least five people have to retire before you achieve this level of responsibility!

You might be thinking “But I don’t know enough to be a Field Engineer.” Rest assured that for the first two years or so you will be trained by an experienced Engineer. Guaranteed, you will learn more practical engineering in one year than four years in college. Five years on the road, and you’ll be ready to advance to your Professional Engineer license!

There are advantages to working as an engineer overseas. The first is pay. Engineers in the present economy are in demand and getting very good starting salaries. On top of that, overseas work often pays a “premium”, depending on the hardships encountered. Brazil is 10%, Kyrgyzstan is 25%, Canada is zero. Overtime pay is not uncommon. Living expenses are paid for, plus a daily Per Diem. One of my colleagues spent ten years living on an expense account with no “home” bills. When he came in from the cold he was able to choose his ongoing career without concern for pay; an envious position.

You will have the satisfaction of contributing to the general economy of the country. These are multi-million-dollar projects, with sizeable significance. After I commissioned an 1,100 ton per day cement plant in Ecuador, an upgrade from a mere 200 ton per day plant, everyone’s pay doubled, and 150 more people were hired. I’m proud of that. I noticed an immediate increase in the prosperity of the area, from a manufacturer of concrete blocks to truck stops along the highway.

There are, of course, some pitfalls. Starting a family may have to be postponed. If you insist on knowing exactly what it is you’re eating, and you have a sensitive stomach, you may wish to reconsider. If you’re sitting on a 15,000 ft. mountain in Peru and are incapable of entertaining yourself, cannot live without 72 channels on television or a McDonalds down the street, maybe you should stay home. On the other hand, you might enjoy Cuy (guinea pig) or that all-time favorite, breaded mystery meat.

My travels have taken me to 50 countries on all continents. I have visited the Pyramids of Teotihuacan in Mexico, the Buddhist temples at Borobudur in Java, seen the exquisite beauty of the Dome of the Rock and the Al-Aqsa Mosque on the Temple Mound in Jerusalem, and attended Easter Sunday church service in Kaiser Wilhem’s Retterkirche.

In Java we celebrated that most American of holidays, Thanksgiving, with people from fourteen countries. I’ve been at tables with conversations in five languages going on simultaneously. My grandchildren have fossils from the Plano Alto of Bolivia, and cow bells from Sulawesi.

The things you build will last for many years, and have a lasting impact on the people that follow you. A sense of accomplishment at an early age. Consider it.
For many years, wood-framed modular construction has been a solution in the residential market. While this type of construction has been a good solution for one- and two-family residential construction, it has been limited by factors such as available beam spans, lateral force resisting system requirements, and fire resistance, affecting its use in larger multi-story projects such as hotels and dormitories. This article will explore the benefits of using steel-framed modules to achieve greater exterior opening distances, increased floor plan flexibility, LEED certification, and non-combustible occupancies.

Additionally, it will discuss the concept of the off-site “Build Together” process used by one manufacturer to ensure a precise fit of components, including structural, plumbing, electric, HVAC, and fire protection systems.

Modular construction has been used in residential construction for more than a century. For the purposes of this article, “residential” shall include one- and two-family dwellings and townhouses – as covered by the International Residential Code – and commercial enterprises, including dormitories, apartments, and hotels – as covered by the International Building Code R-1, R-2, R-3, and R-4 occupancies. While the concept of building in modular units is not new, some relatively recent advances in modular technology have made the process very attractive to certain project types and conditions.

It is important to make a distinction between modular construction and manufactured or “mobile” homes. The most significant differences between these types of structures is that modular construction must be built to the same building codes as conventional stick-built construction and be placed on a permanent foundation, while manufactured homes are built to the Housing and Urban Development standard, and may not be required to be installed on a permanent foundation. Manufactured homes are limited to one- and two-family residences and would not be appropriate for use with R-1, R-2, R-3, or R-4 occupancies.
Process. The modular construction process involves construction of modules off-site and transport to the permanent building site. The modules are constructed in a controlled environment, often in an assembly line.

Modular construction requires specialized detailing to accommodate the connection of the modules and additional ceiling to floor space to allow for framing in the top of the lower module and in the floor of the upper module.

Materials. In the past, wood construction was the obvious choice for residential construction, whether modular or conventionally built. Practically speaking, wood remains the most economical material for one- and two-family housing, as well as for many R occupancies.

Steel modules have come onto the market more recently. These modules are typically constructed with a structural steel frame, steel and concrete floor deck, and cold-formed steel wall panels.

ADVANTAGES OF MODULAR CONSTRUCTION

Quality. The modular manufacturing and approval process requires adherence to all applicable codes. Quality control staff within the manufacturing facilities are responsible for reviewing the work for each trade. While code enforcement rigor can differ by locality, all modular units are required to be inspected by a third party agency prior to being shipped. Several states also require a separate code review and approval process for modular units prior to issuing a permit for construction.

Speed. Because the superstructure is constructed off-site, the fabrication of the building can begin in conjunction with the foundation preparation. This can reduce the time from beginning of construction to occupancy by 30%-50%. The time saved on site can translate into reduced costs for general conditions, for such items as trailer rental, construction management staff on-site, and utility costs. The ability to occupy the building in a shorter period of time also represents a faster return on investment.

ADVANTAGES OF STEEL CONSTRUCTION

Sustainability. The off-site fabrication process results in less material waste than traditional site-built construction. Steel modular construction is exceptionally

“Modular” continued p. 14
Pennsylvania Architect Tests the Limits of His License

John Wanner CAE, Executive Director, PSPE

The Commonwealth of Pennsylvania has stringent regulations in place to ensure that only licensed professionals work on projects for which they are licensed, and even those professionals must stay within the boundaries of their profession. Architects and engineers are permitted incidental practice of the professions of others, but there is a boundary that cannot be crossed. One Pennsylvania architect tested the limits of this boundary when, in October 2008, he tried to draft and sign off on engineering components of a Whitpain Township renovation project.

Disregarding Pennsylvania state architecture, engineering, and township codes, Mitchel Abramov convinced a Whitpain Township businessman that he was qualified to design all components of a renovation project. In October 2008, Abramov started to draft renovations for Mr. Ron’s Offices and Test Kitchen, owned by John Gallagher. The original concept called for minimal architectural adjustments to an existing structure; Abramov ended up designing and submitting plans not only for the structure, but the engineering components as well.

Licensed specifically as an architect, Abramov continued to design engineering components of the new plan, including the electrical, mechanical, and plumbing floor plans, as well as the floor plan notes and reflected ceiling plan. By definition, these tasks are not within the scope of expertise of a Pennsylvania licensed architect. However, Abramov affixed his architectural seal to the plans and submitted them to the Whitpain Township Building Code officials for review and approval.

Of additional note, Mr. Ron’s Offices and Test Kitchen was originally constructed without an occupancy permit or township approval. As a licensed architect, Abramov should have known that he was responsible for reporting the lack of a permit, and for obtaining one from the Department of Labor and Industry before he commenced his own project.

Nonetheless, Abramov twice submitted his plans for slight architectural renovation and widespread electrical, plumbing, and HVAC system placement. Twice the Whitpain Township Building Code Enforcement Office denied his plans for Mr. Ron’s Offices and Test Kitchen because they were not drafted or sealed by someone authorized to draw and seal such plans, an engineer licensed in Pennsylvania.

On these occasions, Abramov continued to assert that he did not require the services of a licensed engineer because he himself possessed the knowledge and skill to adequately design such systems. He told the Whitpain Township Board that his thirty years of architectural expertise should be sufficient to warrant a personal seal on his plans for Mr. Ron’s Offices and Test Kitchen.

John Gallagher, Abramov’s client, claims he did not know the architect was not a licensed engineer, and as such, unable to design and submit the engineering components of the plan. After the Whitpain Township board denied the plans, Gallagher was then burdened with the financial responsibility of finding and hiring a Pennsylvania licensed engineer who could correctly design the
appropriate components of the project.

Based on the occurrences of October 2008, the Commonwealth of Pennsylvania, Department of State, Bureau of Professional and Occupational Affairs brought a case against Abramov to both the state Architectural Licensure Board and the State Registration Board for Professional Engineers, Land Surveyors and Geologists. After careful consideration and review, both boards proffered Consent Agreement and Orders, which Abramov signed.

**The findings and conclusions of The Architects Licensure Board are as follows:** Mitchel Abramov violated the Code at 49 Pa. Code 9.151(9) “by knowingly practicing architecture in violation of relevant State and municipal building laws and regulations and...knowingly making or issuing a statement that is misleading, deceptive, or fraudulent in regard to any aspect of his professional responsibilities or capabilities when [Abramov] drafted documents reserved for the practice and design by a professional engineer and asserted his capability to produce and submit said drawings for permitting” (Commonwealth of Pennsylvania Department of State Before the Architects Licensure Board, Consent Agreement and Order, 10). The Board ruled that Abramov must submit a written apology to Whitpain Township Building Code officials and pay a civil fine of $2,000. Additionally, Abramov’s architectural licenses and registrations were suspended for thirty days from the signing of the consent agreement (dated March 14, 2013.)

Mitchel Abramov appeared before and signed a consent agreement with the State Registration Board for Professional Engineers, Land Surveyors, and Geologists. This body ruled that, by designing and submitting documents without the proper registration, Abramov violated the Engineer, Land Surveyor, and Geologist Registration Law, Act of December 19, 1990, and/or the amended Act of July 2, 1993. This ruling was passed because “at all relevant times, [Abramov] did not hold license and registration to practice as a professional engineer in the Commonwealth of Pennsylvania” (Commonwealth of Pennsylvania Department of State Before the State Registration Board for Professional Engineers, Land Surveyors and Geologists, 12).

Once again, Mitchel Abramov was ordered to write and submit an apology to the Whitpain Township Building Code officials and pay a civil fine of $1,000. The Board further ruled that “he must cease and desist from offering to practice, implying he can practice, or the actual practice of any design for which he has no license or registration to practice, namely professional land surveying, professional engineering, and professional geology” (12).

Because he possessed more than thirty years of architectural design experience, Mitchel Abramov assumed that he was qualified to design other components necessary in renovation or building of a new or existing structure. He was so confident in his alleged experience that he took the extraordinary step to affix his architectural seal to an official document, which he then submitted to the Whitpain Building Code officials. This false confidence caught the notice of the Pennsylvania State government. Their laws and regulations are in place to protect the general public from falling victim to unqualified and illegally designed buildings.
"Modular” continued from, p. 11

sustainable, as structural steel shapes produced in the United States contain approximately 80% recycled content. Because steel is the most widely recycled material, when a steel modular structure reaches the end of its useful life it may be easily dismantled and recycled, thus diverting what would otherwise be construction material headed for a landfill.

Steel modular buildings may be designed to be disassembled and relocated, prolonging the structure’s useful life. This concept is currently being explored by developers following the Marcellus Shale development in northern Pennsylvania and the anticipated development in New York. While a steel modular structure could be disassembled with relative ease, the same cannot be said for wood framed modules.

**Fire Resistance.** Steel and concrete construction is compliant with Type II Construction. The inherent fire resistance of these materials allows for increased building height and footprint. In Europe, steel modular construction has been used in buildings up to 24 stories in height, and a 32-story high rise is currently underway in the Atlantic Yards sports village in Brooklyn, NY.

**Structural.** Steel modular construction allows for longer opening spans when compared to wood-framed modular construction. The rigidity of the module frame is greater than that of site-built construction and may be considered as part of the lateral force resisting system. Where additional capacity is required, steel cross bracing, knee braces, moment frames, or shearwall panels are all options available to the engineer. Because of the ease of connection and the higher capacity of steel connections versus the capacity of wood connections, steel frames are more likely to act together when connected across mate lines.

The use of steel also offers the advantage of consistent material properties and durable long term behavior. When the building design allows for repetitive module sizes and design, the engineering analysis and detailing for such a structure also becomes simplified and more efficient.

**Design Flexibility.** Increased spans and tolerance for concentrated loads or cantilevered conditions allowed by steel construction provides a high degree of design flexibility for architects. Because steel allows increased spacing between structural members and greater spans can be achieved with shallower members when comparing steel to wood construction, more space is available in the ceiling to floor space to run plumbing, electrical, and HVAC. A typical floor joist spacing with conventional wood or light-gage steel joist construction is 16” on center, while the joist spacing in the structural steel and concrete system is typically four feet for floors and up to five feet for roofs. In addition, the typical structural steel joist depth used can be shallower than wood or cold formed joist options.

**REFERENCES**


Is It Flushable? 
Why Does It Matter? 
Johann F. Szautner, P.E., P.L.S.

The Problem: Mr. and Mrs. Good Housekeeping converted their basement into a home office and recreation den with a bathroom. This was undoubtedly a substantial investment, but certainly worth it, since Mr. Housekeeping had recently retired and started a consulting business out of his home. Dropped ceiling, wall paneling, carpet tile flooring, and the brand new toilet were in place when a severe storm struck their town, resulting in several days of torrential downpours. On the morning of the third day, they experienced a power outage, and Mr. Housekeeping went into the basement to check the circuit breakers. Before he could turn on the light switch he stepped into ankle deep water, or so he thought. There was water alright, but he also noticed distinct items that are typically associated with what is flushed down the toilet. He opened the bathroom door and witnessed the artesian fountain the toilet had become.

Mr. and Mrs. Housekeeping experienced a backup of waste water into their home, and upon denial of their insurance claim by their home owners insurance company, filed a lawsuit against the town and their sewer authority to recover the costs of the clean-up and damages.

Engineering Analysis: When the floor of a building is at an elevation lower than the next upstream manhole on the sewer collection system, a blockage in the main sewer can lead to overflow of waste water into the building. Sewer backup is one of the most common basement flooding occurrences in any municipality with a central collection system.

Although municipalities undertake proactive steps to locate and inventory collection pipes with potential for flow blockage, these blockages continue to happen. On the one hand, blockages are related to what sewer users flush into the system, and on the other hand we know that our infrastructure, especially in older urban areas, is and has been for years completely underfunded, not only for capital improvements, but also for routine maintenance.

Many sewer systems are plagued by illegal inflows from rainwater collection to sump pump discharges and ground water infiltration through leaking pipe joints and manholes. Street trees and landscaping, if not carefully planned, are another potential for flow blockage, as plant roots will seek and find wastewater flows sources for nourishment.

Routine inspections of known problematic pipe sections is the best way of locating potential problem areas and addressing them with maintenance, including flushing and vacuuming. The municipality or operating authority is typically responsible for maintenance of the sewer collection pipes and building laterals within the road right-of-way or easement, while building owners are responsible for maintenance of sewer laterals on their properties.

In the case of the Good Housekeepings, their town’s sewer authority maintenance crews responded to sewer blockage incidents as they occurred. Random inspections were done in known problem areas, and maintenance, including chemical treatment and pipe flushing, followed. The township engineer prepared a comprehensive plan for managing sewer overflows, but the authority had not implemented it. Their case settled for an undisclosed amount.

Mr. Szautner, P.E., P.L.S, D.I., is a Professional Engineering Consultant, specializing in Forensic Engineering and providing services to attorneys and insurance claims adjusters.
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.

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