

# cross sections

Magazine for the Structural Engineers Association of New York

2013 VOLUME 18 NO. 3



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2013 VOLUME 18 NO. 3

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Severely damaged waterfront house in Brooklyn after Hurricane Sandy in 2012. (With the first floor bearing wall removed on two sides, the second floor has partially collapsed; the roof and upper walls are held in place – for the moment – by the walls acting as cantilevering and spanning beam elements.)

Photo: Eytan Solomon



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## President's Message

As another Board year comes to a close, I want to take this opportunity to thank many in the organization who have made this a very successful year for SEAoNY. First I want to thank the past year's Board of Directors, which guided the organization to another successful year. This past year our membership increased as did our revenues thanks in part to the efforts of the Board. Both of these increases allow SEAoNY to offer its members the benefits they have come to expect: valuable technical lectures, enjoyable social events, advocacy, education and outreach. Specifically I want to thank outgoing Board members Karl Rubenacker and Vesna Hadzibabic for their service to the organization. I also want to welcome incoming Board members Eugene Kim and James Vignola.

The past year saw New York's structural engineers assist the New York City Building Department with its rapid assessments of buildings in the aftermath of Super Storm Sandy. Sandy changed our thinking, infusing urgency in confronting climate changes and changing how New York's infrastructure will be designed and built in the years to come. "Resiliency" has joined "sustainability" in the lexicon of New York's design community. And in an eerie repeat of history, Typhoon Haiyan has decimated large portions of the Philippines. While our skills and knowledge as structural engineers may not be of immediate help to the people of the Philippines, I would encourage everyone to do what they can to assist in any way possible. Please visit <http://www.redcross.org/> to learn how you can help. And please refer to the May 2010 issue of Cross Sections (<http://www.seaony.org/publications/files/SEAoNY-Vol15-01.pdf>) to learn how you can become involved and be prepared to assist those in need after the next event.

In the months and years to come, lessons will be learned from Typhoon Haiyan as they have been from Hurricanes Sandy and Katrina. For those who are not yet members of SEAoNY, please join the organization and voice your opinions about how SEAoNY can inform those lessons and shape our industry for the better. Many thanks to SEAoNY's current members and tireless leaders for the privilege to be your President for the past year.

Scott Hughes



## Editor's Message

This issue of SEAoNY Cross Sections touches on a diverse range of topics. As always, our goal is to provide our readership with balance of articles that are technical, thoughtful, and insightful. Within this issue we reflect on the changes to our industry wrought by Hurricane Sandy, debate the pros and cons of SE licensure, explore an ancient aqueduct with the programs committee, and are granted a unique perspective of the interview process by a local firm's principal.

Over the past few months, the publications committee has been making great strides to evolve Cross Sections a consistent, quarterly magazine. This includes improving the way that we attract and maintain advertisements, streamlining our layout procedure, and generating a stockpile of interesting and engaging articles that touch on all facets of our industry. These changes do not come to fruition without the tremendous effort of all the volunteers that make up this committee and I'd like to acknowledge and thank each of them for their help.

If you would like to be part of this transformation please consider attending the next SEAoNY Publications meeting. For more information please email us at [publications@seaony.org](mailto:publications@seaony.org).

Justin Den Herder

# UPCOMING EVENTS

- Dec 2 @ the CfA    **Annual T.R. Higgins Lecture (Presented in Conjunction with AISC)**  
**"Structural Innovation: Combining Classic Theories with New Technologies"**  
 Speaker: William F. Baker (SOM) • Registration @ 5:45 | Lecture @ 6:15
- Jan 21 @ the CfA    **"10 Most Common Areas of Design Professional Liability"**  
 Speaker: Scott Winikow (Donovan Hatem) • Registration @ 5:45 | Lecture @ 6:15
- TBA    **SEAoNY Happy Hour**

Visit [www.seaony.org/programs](http://www.seaony.org/programs) for additional information on these and other events!



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Photo by Michael Mahesh, Port Authority of New York and New Jersey



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take a walk with the programs committee at the...

# THE OLD CROTON AQUEDUCT

By Alice Oviatt-Lawrence

OVER TWENTY SEASONAL MEMBERS AND FRIENDS TOOK THE 11:45 AM OUT OF GCT and enjoyed the train's scenic waterfront exposures while incidentally viewing a few world-class City bridges along the route. Carl Grimm, Ossining architect, led the tour assisted by fellow Friends of the Old Croton Board Member and engineer, Bob Kornfeld of Thornton-Thomasetti. After suffering decades of water-short New York City plagues, fires, and Aaron Burr's 1799 attempt to hoodwink locals into thinking he was constructing a water system (while secretly starting a bank

instead); New York City citizenry began by the early 19th century insistent appeals to the government to fund \$11.5 million for infrastructure to provide sufficient quantities of desperately needed City water. The government repeatedly balked at the expense but finally - after legislatively breaking up what was left of the Burr-era water controls - submitted to a successful popular referendum in April 1835.

After engineer David Douglas surveyed the land from 1833 to 1836, John Jervis (M. E., C. E.) was hired by the New York State Governor-appointed Board of Water Commissioners to design and build the City's first reliable water supply system.

Ready labor abounded. About four thousand workers - comprised of prisoners from nearby Sing Sing prison (1828), large numbers of recently arrived Irish immigrants, and local unemployed tradesmen - built the aqueduct, the High Bridge, and the reservoirs. Rioting and wage strikes impeded Jervis as he assigned half-mile segments of the job to private contractors.

Completed by 1842, the technologically advanced and entirely man-made system was based on gravity-flow. The 41 miles-long aqueduct carried water from the Croton River and Dam through 16 tunnels - either bored through solid rock or cut-and-cover constructed. None of the system water was pressurized. Six weirs and 33 ventilation shafts were incorporated into the project. Underground, the hand-cut rock conduit-tunnel diameters are about seven and one half by eight and one half and are sometimes lined with early 19th century machine-made, slightly irregularly-sized brick. Brick was laid in five-course common-bond of two interlocking wythes using hydraulic lime mortar, which was used throughout the project in the cements, grouts and concretes to minimize leakage.

Within a larger than required stone-arch "bridge" structure built over Sing Sing Brook is carried a cast iron lined, watertight aqueduct conduit. To reduce the dead-load on the arch, Jervis based his design on an idea from Thomas Telford: He constructed a

lightweight interior spandrel and cross wall scheme above the barrel arch, rather than installing the usual rubble fill. The resulting internal voids also provide large dead-air spaces which prevent freeze-thaw problems.

Across the Harlem River, the City's oldest existing bridge - the 1200 foot-long stone-arched 1837-48 single span High Bridge supplied water to New York City via 36 inch diameter iron pipe until 1862, when 90 inch diameter iron pipe was installed to meet increasing City demand. From a receiving reservoir in Central Park, the water was piped in two 36-inch pipes southward underneath Fifth Avenue and distributed from a reservoir in Bryant Park. After 1965, the New Croton Aqueduct replaced Jervis's system.

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**Lange, Robie. S.** *Old Croton Aqueduct, National Register of Historic Places Registration Form.* Washington, D. C.: National Park Service. 1991

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historic-structures research and analysis.



The SEAONY tour led by Carl Grimm.

Photo: Alice Oviatt-Lawrence



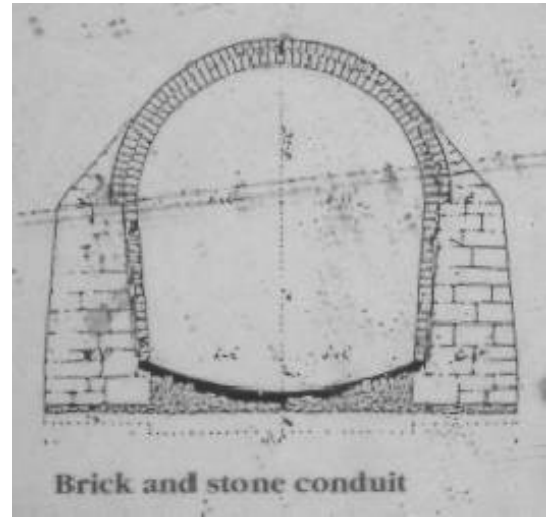
*above*

Map which shows the extent of the aqueduct.

*above right*

Cross section drawing of the 1837-42 Old Croton Aqueduct. The rock underground conduit is lined with early 19th-century machine-made brick, and the mortar contains hydraulic lime for watertight construction.

Images: Visitor Center Placard, Ossining N.Y.



Transverse cut through typical double-wythe brick water conduit, c. 1842. Exposed in 1928 during excavations on W. 105th St.

Photo: Bone Pg. 51



The SEAONY tour group passing under an Elliptical Arch.

Photo: Alice Oviatt-Lawrence

## MAKING THE CASE FOR / AGAINST SE LICENSURE

# The Great SE Debate

BY SCOTT HUGHES & JUSTIN LAWSON

**AT THE NCSEA NATIONAL CONFERENCE IN OCTOBER 2011**, NCSEA joined the Structural Engineering Institute (SEI) of ASCE as well as CASE (the structural engineering arm or ACEC) in adopting a policy statement in favor of separate licensure for Structural Engineering (SE). This adoption followed several “summit” meetings between ACEC, ASCE and NCSEA at ASCE’s headquarters in Virginia to discuss the topic. These “summit” meetings were held in 200, 2002, 2004 and 2008. Since 200, the number of states that recognize Structural Engineering as a separate license has gradually increased, such that today ten states have adopted either full or partial practice acts, or title acts. The concept is gaining momentum across the country, and the purpose of this article is solely to inform SEAO NY’s membership of the issues that pertain to separate licensure in New York State. To begin, a brief primer on terms may be necessary to frame the debate.

There are several “levels” of credentials that pertain to the recognition of structural engineering as a separate and unique discipline within civil engineering. Currently, several organizations provide “certification” of structural engineers. These include the Structural Engineering Certification Board (SECB) as well as NCEES, who have established the “Model Law Structural Engineer” (MLSE). Certification is strictly a credential and does not carry the weight of law behind it, but it informs clients and colleagues that an engineer has met the minimum requirements of certification by these organizations. The next “level” of credential is a “title act”. This does carry the weight of law behind it, but it does not restrict the practice of structural engineering in any state that has adopted it. In other words, it recognizes structural engineering as a separate and unique discipline and provides for a separate license for “Structural Engineer” as opposed to “Professional Engineer” (thus allowing an engineer to add “SE” as a credential), but does not require that one be a licensed SEAO NY structural engineer to practice structural engineering. Several states have adopted Title Acts. These include Idaho, New Mexico and Nebraska. The next step is a “partial practice act”. Again, this carries the force of law, and it restricts some practices within structural engineering to licensed Structural Engineers. For example, one may not need to be a licensed SE in order to design one- and two-story buildings, or single family residential structures. Or, one may need to be a licensed SE in order to design “critical structures”, such as hospitals, schools, or buildings above a certain height. A number of states have adopted partial practice acts. These are California, Nevada, Oregon, Utah and Washington. Finally, there is a “full practice act”. Just as the name implies, this type of law dictates that an engineer must be a licensed SE in order to practice structural engineering in any form. Any project involving the building structure must have drawings signed and sealed by a licensed SE. Two states have adopted such a law, Hawaii and Illinois, which was also the first state to adopt a practice act of any kind, in 1909.

Given this background, and the gradual momentum building across the country to adopt such laws in other states, the question before SEAO NY’s membership is whether such a law is appropriate for New York. Following are arguments made for both sides of the debate, and we hope that this article will help to inform the membership and allow each of you to make your own, informed decision on the subject.

*A number of states have adopted partial practice acts. These are California, Nevada, Oregon, Utah and Washington.*



*the discourse...*

**FOR** → ← **AGAINST**

**A FUNDAMENTAL PRINCIPLE OF ANYONE PRACTICING ENGINEERING** in the public realm is to ensure the health, safety and welfare of the public. It is akin to the Hippocratic Oath taken by doctors, and it must be the guiding principle behind everything we do as structural engineers. To that end, in order to ensure that the health, safety and welfare of the public is being protected, we need to know that those practicing structural engineering in New York are adequately trained, are engaged in its practice on a daily basis, and that they are maintaining their knowledge of current and best practices in the industry. A SE Practice Act in New York would go further than the current PE licensure in protecting the health, safety and welfare of the public.

The primary counter argument to this is that it's not necessary, that a SE Practice Act would not appreciably increase the public's protection. (It is sometimes referred to as the "show me the bodies" argument.) It is also argued that the free market can address the issue of un-qualified engineers practicing structural engineering. Why would an engineer put his livelihood at risk in order to practice a field for which he or she is not qualified? No question, these are valid arguments.

However, if the events on Wall Street over the last several years have taught us nothing else, they have demonstrated that regulation is necessary. And self-policing simply is not a reliable assurance that the public will be protected.

The purpose of a SE Practice Act is not to address the vast majority of those in New York that practice engineering lawfully and responsibly. It is to target an acute minority of those who convince themselves that sub-standard qualifications are adequate. Many times they may be, but too often they are not. How do we know? Admittedly the data is scarce. One reason for this is that many of the cases that demonstrate the need for competence in the structural engineering discipline are tied up in court, and the facts remain undisclosed. Further one has to ask: How many bodies would it take? How many innocent people would have to be sacrificed to deem this a necessity and in the public interest? A SE Practice Act would not guarantee a complete elimination of errors or incompetence. But it would raise the level of minimum competence required to practice the profession, and it would be proactive and go further in protecting the public. It would preempt the bodies.

Another reason to enact a SE Practice Act is that it would increase the prestige of the profession. The qualifications of

**THE PROPOSAL FOR A NEW STRUCTURAL-SPECIFIC PE LICENSE IS GAINING FORCE** now that ASCE and NCSEA have drafted policies endorsing it. Reasoning behind the proposed change to licensure laws is that it will better safeguard the public by ensuring structural engineers are competent to do what they do. In the recent article, "The Case for Structural Licensure" (Structure, September 2011), Jon Schmidt has suggested that structural engineers have in some ways a greater responsibility than doctors, as the work of an engineer can affect more people: "a single mistake by a doctor can cause one person's injury or death, while a single mistake by an SE can lead to an even greater tragedy." Therefore, he argues, the public needs to be protected just as much against incompetent engineers as it is against incompetent doctors, if not more so. The new discipline-specific SE exam is believed to be a more effective means of demonstrating one's basic competence in structural engineering.

While it may be true that the new exam requires engineers to study more material now to pass, the claim that it will reduce unqualified practice lacks evidence. The exam on its own cannot account for all the skills required to be a competent engineer. Here the exam itself is seen as the key component to guaranteeing basic competency. But producing error-free construction documents entails more than a basic understanding of physics and mechanics. Organization, communication, time management, and quality control all play a significant part in a successful project. The exam does not address these aspects of practice and does not claim to. These aspects could arguably be accounted for in the experience and education components of licensure; however, no substantial changes to these requirements are part of the current proposal.

Proponents argue that PE's licensed in other disciplines sometimes will practice structural engineering when they are not qualified to do so. Whether these engineers more often do so willfully or strictly out of ignorance is not known. If the former is the case, then no amount of well-intentioned testing would necessarily affect a person's decision to accept a project once he/she becomes licensed. If the latter is the case, it is hard to imagine how simply studying for another eight hours of problems once in a career will remedy any serious ignorance on the part of the test taker. If the first eight hours of material did not suffice, why should the second?



those competent to practice structural engineering would be apparent to architects, clients and the general public through separate licensure. This could lead to higher fees. It could also lead to lower premiums for errors and omissions insurance. Most E&O underwriters recognize the benefits of SE certification (by the SECB) and take this into account when calculating insurance premiums. Separate licensure could take this even further.

Some would say that this unfairly restricts the practice of structural engineering. This is sometimes referred to as “gate-keeping”. To an extent, this is an attempt to restrict the practice – to those qualified. However, it is apparent that this has led to un-founded fears that qualified structural engineers will no longer be able to practice in states that have separate licensure. Nothing could be further from the truth. All states that have passed SE Practice Acts have included an equitable transition clause, also known as a “Grandfather clause”. Any proposed practice act in New York must include such a clause and cannot impact the livelihood of qualified engineers already practicing structural engineering lawfully and responsibly.

However, those that are practicing structural engineering as such would do well to make sure that others that also practice structural engineering are doing so responsibly. The aphorism, “High waters raise all boats” applies, and conversely those that aren’t practicing structural engineering responsibly – again, we’re referring to an acute minority – lower the public opinion and prestige of the profession. So yes, a SE Practice Act would restrict the practice, but reasonably so.

### *“High waters raise all boats...”*

Finally, it would be in the best interest of New York State structural engineers to pass a Practice Act as it would enable them to keep pace with the rest of the country. While separate SE licensure is an idea that is slowly gaining momentum in other states – with those states primarily located on or near the West Coast – rest assured that it is gaining a foothold on the East Coast and will come to the Northeast at some point. In order to maintain comity with other states in the Northeast and across the country, New York needs to recognize separate licensure. In other words, NOT adopting a SE Practice Act could in fact impact structural engineers in ways that they fear adopting would. Eventually the practice of SE’s in New York could be restricted without adequate recognition of structural engineering as a unique and separate discipline. If comity erodes, so do our practices.

Some have argued that ongoing changes to the profession, such as more complex projects and more convoluted building codes, are good enough reasons to establish a stricter licensing exam. However, the intent of the new exam remains as it was - a demonstration of minimum competence in structural engineering. The complex projects here discussed typically require more detailed knowledge than the basics; therefore, it cannot be said that such an exam can assess one’s qualification to undertake such projects.

Furthermore, I would argue that for structures built today, it is often not the end product that is increasingly complex as much as the design and construction process. Ever-increasing use of analysis software and BIM for design has arguably been a more significant change in practice – and these are not the subject of the SE exam. The motivation for a tougher exam as a result of increasing complexity of the state of practice seems dubious at best.

But fundamentally, any argument for stricter licensure laws already faces a number of challenges. There is little evidence available to show that licensing engineers at all actually increases the quality of engineering provided to the public. However if it could be proven that stricter requirements would successfully increase the quality of engineers who practice, there would almost certainly be less engineers. Given the same demand for engineering services, prices for licensed engineers would rise. It could be argued that some consumers, not able to afford higher prices, would seek sub-standard means, such as do-it-yourself work for smaller jobs. The average quality of engineering in such a case could actually decrease.

### *“There is little evidence available to show that licensing engineers at all increases the quality of engineering to the public.”*

Even if such a scenario did not arise, licensure presents other problems which tend to run counter to the stated goal of safeguarding the public. For example, incompetent engineers who manage to obtain PE’s gain more business than otherwise. The same could just as easily be true of SE’s who manage to pass the tougher exam.



What is the path forward in New York? Many options exist. As noted above, passing a Title Act is one option that addresses many of the concerns about restricting the practice and impacting livelihoods. In addition, a Title Act may be a stepping stone to passing a partial or full Practice Act in the future. Whatever the path forward, it will require that the voices of those in favor be heard by our legislators in Albany. And as the most populous state in the Northeast, it will probably be New York that takes the lead in this effort. But first, we need to decide what is right for New York. It is readily apparent that separate licensure is in the best interest of qualified engineers that are practicing structural engineering lawfully and responsibly in New York. If you agree, let your voice be heard.

By limiting the number of practicing engineers, there will necessarily be less competition. It is well recognized that less competition typically equals less innovation and slower progress within an industry. There is good reason to believe that progress in our technology-heavy field could be slowed as a result of a fewer practitioners.

With these points in mind it seems more likely that this licensure proposal is aimed at benefiting engineers themselves rather than the public. Tighter restrictions on entry into the profession will almost certainly tend to increase the fees engineers can charge, by way of reducing competition. The primary parties advocating the change are the ones who will directly benefit from increased costs, that is, the producers, not the consumers. I do not know of any call from the general public, the consumers, to increase restrictions on structural engineers.

Practicing engineers would be better served by the professional organizations if they devoted more of their resources to improving the standards of practice rather than lobbying for tighter restrictions on simply who can be called an engineer.

---

*[for]*  
**SCOTT HUGHES, PE, SE**  
*is a principal at Robert Silman Associates.*

*[against]*  
**JUSTIN LAWSON, PE**  
*is a structural engineer at Severud Associates.*





# AFTER SANDY

## WE WERE CAUGHT OFF-GUARD.

Because it travelled northward from the south, because it was rotating counter-clockwise, because the surge happened to hit land at high tide, because our flood maps are based on too narrow information and assumptions, because even with flood maps we allow so much to be “grandfathered” in, because we rely on our electricity and trains... because because because... It all seems so simple in hindsight.

Five weeks earlier, Ramon Gilsanz spoke to the Structural Engineers Association of New York as the honorary member at the group’s annual meeting. He said, paraphrasing, that engineers must become politicians in order to enact real change for the betterment of humanity.

Five weeks later it happened, and six weeks after that Tom O’Rourke spoke to another SEAoNY gathering entitled “The New Normal For Natural Disasters”. Again the theme resounded: Engineers must not wait for an invitation to become a voice in the local, national, and international debates about disaster preparedness and disaster response. Engineers must make themselves integral to the debates. Who else will be the ones to think clearly about extreme events and their impacts, the statistical probabilities, the proper design of

A RETROSPECTIVE By Eytan Solomon

*“Engineers must not wait for an invitation to become a voice in the local, national, and international debates about disaster preparedness and disaster response.”*

infrastructure with safety factors and redundancy and robustness, progressive-sequence failures? Not just how to design for the expected but for the unexpected.

As engineers, our job is to do quantitative reasoning for society, but it is not only that. We are not accountants, we are not investment bankers, we are not robots. We are engineers who shall “hold paramount the safety, health, and welfare of the public”, so says fundamental canon #1 of the National Society of Professional Engineers. Everyday we make decisions based on preparing appropriately for extreme events.

Our engineering is based on one simple concept: Load and resistance. A load – gravity, wind, earthquake, flood - acts on a structure and its resistance – the concrete foundation, the steel frame, the stone façade – must meet the challenge. We would be fools now to pretend that the “loads” and “resistance” we assume act on our infrastructure are exactly what we thought they were.

Hurricane Katrina caught us off-guard. The Tohoku earthquake-tsunami caught us off-guard. The Christchurch earthquake caught us off-guard. Henry Petroski often writes about the advancement of engineering building off of the history of failures.

Well, here we are with another major failure on our hands: The time to advance is now, before the public forgets, before it is subconsciously pushed out of the public mind... that is, until the next disaster.

The time to be heard is now, but what to do? Get on committees, speak at lectures, write op-ed articles, do your own research to educate yourself – use your engineering reasoning to separate the

**EYTAN SOLOMON, PE**

*is a structural engineer at Robert Silman Associates.*

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pith from the noise – and then educate others. How should our building codes change? How should our urban planning change? How should our energy and transportation policies change? Should some areas of human settlement be returned to Nature?

You must help us make the decisions, for there will be hard decisions to make. Either we will make them for ourselves, or Nature will make them for us.

*left*

Collapsed bulkhead in the Rockaways. (The bulkhead was a sidewalk and parking lot, but had actually exhibited earlier signs of settlement and been fenced off from use prior to Sandy.)

*below*

Severely damaged waterfront house in the Rockaways. (With the first floor bearing wall removed, some of the second floor joists appear to be held up – for the moment – by the window mullions acting as hangers from the roof.)

Photos: Eytan Solomon



AS I GROPE MY WAY THROUGH THE DARKNESS OF MY APARTMENT on this cold Monday morning, attempting not to step on any toys that would either pierce my foot or the silence of the morning, I girded myself for another day of interviews. Ah, late-winter – that time of year when the soon to be graduated march through the office seeking gainful employment and we get to try to evaluate, in a one-hour snippet, who the future leaders of the firm are going to be. Or, at the very least, who can competently use a scale and write a sentence.

Walking down the street towards the office, I did my best to repeat my best interview mantra over and over – ‘listen, engage, listen, engage’.

Listen to the remarkable fact that this person in front of me is, believe it or not, a ‘self-starter’. Engage with 21 year old who looks like he bent his hair into neatness and is wearing his suit for the first time. Listen while an over-caffeinated (or is that Adderall?) candidate tells me about the awesome experience she had on the concrete boat team. Engage with the person before me who is seemingly as innocent as the driven snow while trying to determine whether or not it was really his image on that Facebook page doing a keg-stand with the locals while on a ‘humanitarian’ trip last Spring Break.

All the questions we want to ask that often get lost in the debate-like rebuttals from the candidate (stay on message, stay on message, stay on message – I am a team player; I am pro-active; my life is engineering...).

Did you work in a restaurant in High School? Did you fold newspapers or walk dogs or resurface driveways or paint houses? Hell, did you work? Have you done anything with your hands? That internship – did you run errands and fold shop drawings or did you build finite element models and check shop drawings?

That 4.0 GPA – any of those classes in Liberal Arts? Arts? Anything but engineering or applied sciences?

That team project – did you put in your time and more to make the project a success even when your teammates failed to show up to work on the project or did you grouse to your professor that, ‘It was not my fault that things did not get done. I completed the part I was supposed to do.’ If I asked you exactly why it matters that the structure that your team designed settled  $\frac{3}{4}$ ” instead of  $\frac{1}{2}$ ”, would you know? If I asked you to redesign, as a concrete structure, the entire steel building you spent the semester married to – would you even know where to begin?

## Out of Tolerance

# A PRINC

# REBUTTA



*"I did my best to repeat my interview mantra over and over – 'listen, engage, listen, engage'..."*

*Engage with 21 year old who looks like he bent his hair into neatness and is wearing his suit for the first time."*

# IPAL'S AL: INTERVIEW EDITION

By Nat Oppenheimer

More importantly, do you live your life as one long continuum towards some idea of who you should be (leading you to feel constantly unfulfilled and wanting and blaming the firm and your colleagues for all you have not accomplished – "how can I fly with the eagles when I am down here with all these turkeys?!") or are you open to living your life in episodes – seeking fulfillment in each step through your life, wherever it takes you?

How to ask to break through the interview glaze to get to the bottom of these questions?

Do they understand what their day-to-day existence will truly be in one firm vs. another? Do they care at this point? Do they ask to meet other young engineers in the firm and talk to them about their experiences? Do they understand that we are evaluating their ability to communicate clearly, concisely and with conviction and very little else? Do they realize that pretty much anyone can calculate  $w^{2/8}$  but figuring out when to impress and when to just get the job done is the skill we're really searching for?

And then I am fast-forwarding, to those first days on the job. Pinned vs. fixed bases? You mean I need to figure out which it is? It isn't always just a given? And this scale – how do you use one of these? You mean I have to pick a material in RISA and that it doesn't just know whether I am designing a steel or concrete structure?

Now I am back in the moment and the interview is coming to a close. This one appears to have enough of what it will take. That's good news. And then we are saying goodbye – that's great that you're so self-motivated and can't wait to start your career and that this will be the most important step you will take in your life.

So when can you start if we make you an offer?

Really? You can't start until six months after graduation because you have to travel to a distant Greek Island and enjoy the beach before your long slog towards retirement and death begins?

Great. We'll get back to you.

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