

Engineerings

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December 1999/January 2000 Volume 75 Number 4

Award-Winning Quartet To Perform At Annual Banquet

"Club Ned", an award winning barbershop quartet will appear at the PES Annual Banquet, March 2, 2000

by Roy L. Bouvier, Editor/Publisher of *Engineerings*;
President, Providence Engineering Society

The Club Ned Barbershop Quartet will be the featured entertainment at the 2000 Providence Engineering Society Annual Banquet to be held on Thursday, March 2, 2000 at the Providence Biltmore.

Club Ned is an award winning group, and is the Northeastern District of SPEBSQSA's 1999/2000 Quartet Champ.



The "Club Ned" Barbershop Quartet

The members of Club Ned include:

Brett Penkul- Tenor

Brett is the youngest member of the Club, but he isn't short on experience. Brett has sung in quartets such as district finalists 3 Good Looking Guys, Pure Style and By Storm. Brett is the current co-director of the Beverly Northshoremens, a 70 member men's barbershop chorus in Beverly, Ma, and is also dedicated quartet coach. Brett is the only single member of the quartet.

Al St. Louis- Lead

Al is the prominent singer in the Club, and well he should be. His melodious and

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Make Your Reservations!

The Providence Engineering Society Annual Banquet will be held
Thursday, March 2, 2000

Call (401) 434-2332 for reservations or make them online at www.provengsociety.com

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Editor's Note: Due to production delays and illness, this issue is a December 1999/January 2000 double issue. Single issues will resume with the February 2000 publication.

Calendar of Events

AFE	ASCE	ASHRAE	IESNA
<p><i>Visit the PES Online Calendar at www.when.com or through the PES Website for the latest meeting and event information. At the PES Online Calendar enter the login name <code>pes_events</code> and the password <code>pes2000</code>.</i></p>			
RISPE	RISPLS	SARI	SEARI

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Affiliate members each receive a monthly copy of "Engineering" and are urged to submit events and/or articles for publication prior to the 10th of each month.

The Providence Engineering Society Thanks The Following Corporate Members For Their Continuing Support:

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Corporate Member of the Providence
Engineering Society should contact
Dorothy Sadowski, P.E.S. Offices, at
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The Lighter Side

An engineering student was walking across campus when another engineer road up on a shiny new bicycle. "Where did you get such a rockin' bike," the first asked. The second engineer replied, "Well, I was walking along yesterday minding my own business when a beautiful woman rode up on this bike. She threw the bike to the ground, took off all her clothes and said, 'Take what you want.'" The second engineer nodded approvingly, "Good choice—the clothes probably wouldn't have fit."

Mission Statement of the Providence Engineering Society

The Providence Engineering Society is a multi-disciplinary engineering organization dedicated to education and the exchange of information among the various engineering organizations servicing the Rhode Island area.

The Providence Engineering Society offers opportunities to bring professionals together for recognition, fellowship, and the exchange of information. These opportunities for the social and educational enrichment of the membership will be provided through printed page, electronic media, and live presentations.

Larry's Corner

by L. Robert Smith F.ASCE
Past President, Providence Engineering Society

Part I: Hey Kid, Can You Run This Machine?



We were the design engineers for a sewer project, which required the installation of a pre-cast pumping station. The site was adjacent to a river. This fact is going to be key in this story. The sewer contractor had subbed the installation of the pumping station to a contractor who specialized in steel sheeting and had a crane. It was a small company. The owner of the company had lost the use of one arm in an equipment accident, sometime before this installation. This piece of information will also be important to this story. The owner, his son, and a truck driver/laborer were the only people manning this job. The weather was extremely cold and they couldn't start an air compressor. The son was spraying it with ether while his father pressed the starter. Suddenly, the ether exploded and there was a fireball of flame. The son caught on fire and was really blazing. He took off for the river and dove for the water, which happened to be frozen. He rolled on the ice and got to the edge of the open water and extinguished the flames. The son got up with his face burned, his eyebrows gone, his clothes charred, and he was standing in clothes soaked in ice water in air that was about 10 degrees Fahrenheit. The father ran over to him and asked if he could still work. The son didn't think so. As a matter of fact the slacker wanted to go to the hospital and have them treat the burns. Then he wanted to go home to change his clothes. He wasn't sure if he would be back that day. The father was indignant. With only one good arm, how could he run the crane. You needed two arms and two legs to do that. The ungrateful son got into his truck and drove off to the hospital. The father was fit to be tied. Tied!!! Now there's an idea. He tied a rope to the crane bucket and the laborer was supposed to direct the bucket by pulling on the rope. They were to the point of backfilling the station, which was standing in the sheathed pit. With the rope guiding the bucket, the father could run the crane with one arm and two legs. The first shot they whack the super structure and crack the roof. The laborer had been incapable of restraining the bucket. The father chastised the laborer for not trying hard enough. The next shot they shattered the superstructure. The laborer was really laying down on the job, literally. The bucket's momentum pulled him over and dragged him across the ice. His sleigh ride ended when the bucket struck the pumping station. At this point our inspector, who was thoroughly enjoying the show, decided that this was enough fun for one day. He told the father to stop work and went into a house to call me. When I arrived, the father was trying to convince my inspector to let him continue trying to work. He was also trying to

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convince the laborer to try again. I called a halt to all of this. He was sure his son would return soon, and he would run the crane. I told him the next step was to replace the superstructure of the pumping station. The father was indignant. It didn't need to be replaced. They could patch it. I didn't think so. Well as long as they had to replace the superstructure, he would just keep going. I didn't think so. He looked me straight in the eye and asked what he was supposed to do with the laborer for the rest of the day. That wasn't my problem. He then asked me if I knew how to run a crane. Now we were in real trouble.

In a past life I was the sewer inspector, on a part time basis, in the town where I worked. I used to run out during lunch and at the end of the day to make inspections. If there was an emergency, I would take time out of work. I received calls from the public works department as to which services were being installed. I went to one at lunchtime and the home owner was astride the backhoe, practicing. He needed practice, in that the bucket was jerking around like a crack-baby. I asked where the contractor was. The homeowner explained that there was no contractor. He was doing the work with his uncle. His uncle used to install sewers when he was younger. Now the uncle worked in an auto-body shop. I told him I would be back around 4:00pm. I told him to call if there were any problems. I also expressed hope that his uncle was still in practice with a back hoe. The guy gave me a funny look, but didn't say anything. When I returned that afternoon, the main sewer line had been destroyed and the street looked like a bomb crater. The uncle was in the hole, trying to fix the pipe. The homeowner was still practicing on the backhoe. What the homeowner neglected to inform me, was that uncle didn't know how to run a back hoe. He was the pipe man in the hole. When I saw the homeowner practicing, he was getting ready to perform brain surgery with the back hoe. There was a contractor whose house and yard were just around the corner. I recommended that he go over and beg them to repair the broken sewer main and run his house connection in for him. Well he didn't want to do that. He had asked them for a price to do the house service and thought they were awfully high. He felt funny about going back to them now. He then asked if I could run a back hoe. I told him that I could run one just as good as he, that's why he had to hire a contractor to repair the line and fix the street. I also told him that if he didn't I would hire a contractor to make the repair, under a force account, and the bill would go as a lien on his house. Now not only couldn't I run a back hoe for him, but I was being totally obnoxious by making him pay someone to fix the damage he had done.

Safety Association of Rhode Island Requests Articles

The Safety Association of Rhode Island requests that articles related to subjects of safety in the workplace be submitted for use in its monthly "Safety Shorts" series of articles that appear in the "Engineering" newsletter.

Any ideas for articles or submissions of approximately 200-300 words should be sent on disk in any major word processing format to the attention of Ted Muldoon, St. Joseph's Hospital, 21 Peace Street, Providence, RI 02907, Tel.: (401) 456-4454.

Some Real Life Dilbert Quotes

A magazine recently ran a "Dilbert Quotes" contest. The writers were looking for people to submit quotes from their real-life Dilbert-type managers. Here are some of the submissions:

1. As of tomorrow, employees will only be able to access the building using individual security cards. Pictures will be taken next Wednesday and employees will receive their cards in two weeks. (This was the winning entry; Fred Dales at Microsoft Corporation in Redmond, WA)
2. What I need is a list of specific unknown problems we will encounter. (Lykes Lines Shipping)
3. How long is this Beta guy going to keep testing our stuff? (Programming intern, Microsoft IIS Development team)
4. E-mail is not to be used to pass on information or data. It should be used only for company business. (Accounting Mgr., Electric Boat Company)
5. This project is so important, we can't let things that are more important interfere with it. (Advertising/Mktg. Mgr., UPS)
6. Doing it right is no excuse for not meeting the schedule. No one will believe you solved this problem in one day! We've been working on it for months. Now, go act busy for a few weeks and I'll let you know when it's time to tell them. (R&D Supervisor, Minnesota Mining & Manufacturing /3M Corp.)
7. My boss spent the entire weekend retyping a 25-page proposal that only needed corrections. She claims the disk I gave her was damaged and she couldn't edit it. The disk I gave her was write-protected. (CIO of Dell Computers)
8. Quote from the boss: "Teamwork is a lot of people doing what 'I' say." (Mktg. executive, Citrix Corporation)
9. My sister passed away and her funeral was scheduled for Monday. When I told my boss, he said she died so that I would have to miss work on the busiest day of the year. He then asked if we could

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Editor's Note:

Letters, story ideas, and material are welcomed and encouraged. If you have an opinion, press release, or story that you feel is worth sharing, forward it to me via fax at (401) 823-4850 or mail to: Techwrite Services, 3 Congdon St., Coventry, RI 02816, or by Email via techwrite-svcs@home.com.

Larry's Corner

by L. Robert Smith F.ASCE
Past President, Providence Engineering



Part II: Calls That Baffled Me

I came back from a trip and went through my messages. We had just done a topo survey for a client and as part of it located the sewer serving his building. Inverts and pipe sizes had been obtained, in the field, from the city manhole in the street and at the manholes in his property. The message was "problem with sewers!! Need surveyors to check!! Please call ASAP!!" I checked with the surveyors. They didn't think there were any busts. The manhole covers matched the grade contours and all the inverts were about six (6') feet deep. I called the client and told him that we thought what we had done was okay. So did he. He wasn't sure why I had even checked. His message was that there was a problem with the sewer serving the building. He thought the line in the street might be surcharging in storm events. He wanted me to send the surveyors out in a heavy storm event, and measure the depth of flow in the manholes in the street. Why did I think there was a problem with our survey?

Waterman Engineering company was founded as a full-time business in 1894. However, we have found plans dated as far back as 1878. Apparently the company existed as a part-time entity from at least that date. Surveying has gone from chains to electronics. Our archives are made available to our competitors. The only exceptions are, one, if we had bid on a particular project or if I happen to hate the surveyor who wants to use our records. There aren't that many of the latter, but believe me, they well know who they are. A surveyor came in to use our records. At that time, we were still good with him. He pulled out a plan from 1912. He was all smiles. I looked at it and noticed that all distances were to the nearest five feet. Angles were to the nearest thirty minutes. Not to insult the surveyor, but I was of the belief he needed all the help he could get. I explained that this was an old compass and tape farm survey. Bearings were read with a hand held compass. At best, they are "close". The area was 26± acres. I told him to take that with a big grain of salt. I had found that these areas were often "guess-timates". This was under a double whammy as it ran along an oxbow creek on one long side.

About two (2) months later I received a certified letter from a lawyer. His client had purchased 26± acres on the strength of a Waterman Engineering Company survey. Their survey revealed only 18 acres. The Waterman plan did not reflect a number of lots which had dropped out on the road. Their survey also revealed that angles were somewhat off and distances were inexact. They were looking to me to reimburse his client 8/26ths of the sale price, about 30% and to pay their survey or for a week's time he had lost by using our plan. I personally went to the Town Hall. All the frontage lots had dropped out in the post 1960's time frame. The deed to his client was dated prior to their surveyor having come to use our records. The deed called for 26± acres,

excepting therefrom five parcels, referenced by book and page, which had come out since it had been purchased by the grantor in the 1960's. The plat map showed 17± acres for this parcel. I sent back a letter that was less than nice. I told them they had not relied on our plan. Our plan was done in 1912 and was done to an acceptable standard for a farm acreage compass and tape.

That a simple review of the deeds and plat would have revealed that they had purchased only what they got. Any further claims on us would be looked upon as harassment and would cause me to take legal action against them.

The lawyer called. He had not been aware of the deed his client had received and the chronology. Of course we weren't expected to update our plan every time a piece was sold. He had not done the title or the closing. He wrote his letter based upon what his client and his client's surveyor had told him. However, the surveyor did tell him that he had had to spend an additional week in the field running out lines because the ones shown on our old plan were not accurate enough. I explained what the survey was and that their surveyor had been informed of the fact that it was an approximate plan. I wanted to know how long it would have taken if they had not had it. I wasn't paying for anything. I also told him that if the surveyor ever dared to come in to use my records, I would throw him down the stairs.

The surveyor called me. It wasn't him. He explained to his client why he was entitled to more money and the client and his lawyer misunderstood. He was innocent and couldn't understand why I would ban him from using our records. I was baffled. I hadn't said he couldn't use the records. I just said I would throw him down the stairs if he ever showed up here.

Marshall Named RISPE Engineer of the Year

The Rhode Island Society of Professional Engineers has named Raymond Marshall, P.E., its "Engineer of the Year" for the year 2000.

A practicing Engineer for more than 25 years, Ray is currently the Deputy Director of the Narragansett Bay Commission. Ray is a 1973 Graduate of URI and obtained his Master's from Northeastern University in 1978.

Ray has been on the Board of Registration for Professional Engineers since 1986. He was the first person to have been Chairman of the Combined Board for Engineers and Surveyors, as well as chairing the current Board for Professional Engineers, after the original Board was split.

Mr. Marshall is a past Chairman of the Smithfield Planning Board as well as being Past President of the Smithfield Girls Softball League. He is a member of the Bryant College/Smithfield Community Relations Council, the URI Alumni Executive Board, and is Vice President of Phi Kappa Psi Alumni House Corporation.



*Raymond Marshall, P.E.
RISPE Engineer of the
Year*

Important Stuff You Need To Know

1. Rubber bands last longer when refrigerated.
2. Peanuts are one of the ingredients of dynamite.
3. The national anthem of Greece has 158 verses. No one in Greece has memorized all 158 verses.
4. There are 293 ways to make change for a dollar.
5. The average person's left hand does 56% of the typing.
6. A shark is the only fish that can blink with both eyes.
7. There are more chickens than people in the world.
8. Two-thirds of the world's eggplant is grown in New Jersey.
9. The longest one-syllable word in the English language is "screeched."
10. On a Canadian two dollar bill, the flag flying over the Parliament Building is an American flag.
11. All of the clocks in the movie "Pulp Fiction" are stuck on 4:20.
12. No word in the English language rhymes with month, orange, silver or purple.
13. "Dreamt" is the only English word that ends in the letters "mt."
14. All 50 states are listed across the top of the Lincoln Memorial on the back of the \$5 bill.

15. Almonds are a member of the peach family.
16. Winston Churchill was born in a ladies' room during a dance.
17. Maine is the only state whose name is just one syllable.
18. There are only four words in the English language which end in "-dous" tremendous, horrendous, stupendous, and hazardous.
19. Los Angeles's full name is "El Pueblo DE Nuestra Senora la Reina de los Angeles de Porciuncula"-and can be abbreviated to 3.63% of its size "L.A."
20. A cat has 32 muscles in each ear.
21. An ostrich's eye is bigger than its brain.
22. Tigers have striped skin, not just striped fur.
23. In most advertisements, including newspapers, the time displayed on a watch is 1010.
24. Al Capone's business card said he was a used furniture dealer.
25. The only real person to be a Pez head was Betsy Ross.
26. When the University of Nebraska Cornhuskers play football at home, the stadium becomes the state's third largest city.
27. The characters Bert and Ernie, on Sesame Street, were named after Bert the cop and Ernie the taxi driver in Frank Capra's "It's A Wonderful Life."
28. A dragonfly has a lifespan of 24

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The Engineer's Monthly Money Memo, Part I

By: Paul S. Seibert, Jr., P.E., CFP
President, Asset Management Associates, LLC

Have you ever tried to estimate the value of your Engineering education? Any number of studies have clearly proven that college educated people enjoy much higher incomes over their working careers. It also appears that they benefit as well in some less tangible ways, including improved life style, greater intellectual stimulation, better overall health, and a generally more enriched life. While it would be almost impossible to put an accurate price tag on the value of your education, most would agree that it's a significant number, and well worth the expense.

Most would agree as well, however, that putting a price tag on the cost of a college education today is truly a sobering and intimidating experience. Parents have no doubts about the value involved, and are determined that their children should enjoy all of the benefits a college education will assure. The real concerns are what will be the cost when our children are ready for college, and how will we be able to afford it?

Only a few years ago, the cost of tuition was escalating at a rate of 8% to 9% annually! The good news is that in recent years, the rate of increase has reduced to about 4% to 5%. The bad news is--that is still a significant escalation of a number that is already very large. How large? Today, the average cost of a 4 year education at a public school is about \$42,000, and at a private school, about \$90,000. If your child is just starting school, i.e. first grade, you can expect these costs to be about \$75,000 and \$162,000 respectively, in 12 years. And yes, that's just for one child!

Is it any wonder, then, that today's parents are often overwhelmed by the prospect of financing their children's education? Consider that if your child is just starting first grade, and you are just now beginning to save for college, you must invest about \$300/month for the next 12 years beginning NOW to afford attendance at a public college! If your (or your child's) preference is for a private school, then increase that to about \$650/month. Oh, and was it also mentioned that at the same time, you need to be saving for your retirement?

As awesome as all this may sound, there are ways to deal with what may seem at first to be an impossible task. Obviously, the most important element involved is to get the "magic of compounding" working for you as soon as possible. This means starting the savings process as early as practical, preferably at the birth of your children. Let the whole family know about accounts established for your child's education, and encourage contributions as special occasion gifts.

What kind of accounts to open, and where to invest the funds will depend a lot upon your personal circumstances, such as net worth, tax bracket and risk tolerance. There are a wide variety of approaches available, including Education IRA's, Roth IRA's, QSTP's (Qualified State Tuition Programs), UTMA's, UGMA's, and ordinary taxable investments. Next month these options will be discussed in some detail, including the advantages and disadvantages of each.

"THINGS" continued from the previous page

hours.

29. A goldfish has a memory span of three seconds.

30. A dime has 118 ridges around the edge.

31. On an American one dollar bill, there is an owl in the upper left

hand corner of the "1" encased in the "shield" and a spider hidden in the front upper right-hand corner.

32. It's impossible to sneeze with your eyes open.

33. The giant squid has the largest eyes in the world.

34. Who's that playing the piano on the "Mad About You" theme? Paul Reiser himself.

35. In England, the Speaker of the House is not allowed to speak.

36. The name for Oz in the "Wizard of Oz" was thought up when the creator, Frank Baum, looked at his filing cabinet and saw AN, and OZ, hence "Oz"

37. The microwave was invented after a researcher walked by a radar tube and a chocolate bar melted in his pocket.

38. Mr. Rogers is an ordained minister.

39. John Lennon's first girlfriend was named Thelma Pickles.

40. The average person falls asleep in seven minutes.

41. There are 336 dimples on a regulation golf ball.

42. "Stewardesses" is the longest word that is typed with only the left hand.

The Engineer's Monthly Money Memo, Part II

By: Paul S. Seibert, Jr., P.E., CFP
President, Asset Management Associates, LLC

In Part I, the frightening prospect of financing your children's college education was discussed. While the costs estimated are staggering, it's imperative to start early and to have a well developed investment plan which you will follow. Here are some of the options available to help meet these expenses.

While the tax advantages of Education IRA's may have appeal, their current annual contribution limit of \$500 won't even get close to what will be ultimately needed, even if started at the birth of your child. Moreover, you can't contribute to both an Education IRA and a QSTP (Qualified State Tuition Program--more later) in the same year. There is much talk in Congress about changing the limits for Education IRA's, but until and unless that happens, they are of only minimal utility in meeting the expected expense.

Roth IRA's, on the other hand, seem to offer many tax and other advantages, at least as far as they go. Here again, the current annual contribution limit of \$2,000 won't likely result in enough cash to pay all the bills, but will go a long way if started early enough. The trick here is to develop an organized and documented plan whereby your child is paid to perform specific duties around the house. Since only earned income may be used for Roth IRA contributions, this plan should be designed to produce at least the amount to be added each year, up to the limit of \$2,000. Again, Congress is considering raising this limit as well.

Qualified State Tuition Programs (QSTP's) also offer some real tax treatment advantages. However, their high administrative expenses and conservative investment portfolio design may not make them the best answer for every parent. Rhode Island's version of the QSTP is called RIHEST (Rhode Island Higher Education Savings Trust), and it compares well with those offered by other states. Space limitations here preclude a thorough treatment of all the details of RIHEST, but a complete package of information may be obtained by calling 877-474-4378, or contacting their website at www.rihest.com. A reprint of an article entitled "RIHEST: Is It a Good Deal For You?" may also be obtained by emailing "Amaseibert@aol.com", and requesting it.

UGMA (Uniform Gifts to Minors Act) accounts, and its more recent alternative UTMA (Uniform Transfers to Minors Act) accounts once were viewed as possible alternatives for college funding. However, their lack of flexibility, very limited tax advantages and lack of control have made them less attractive than most of the other options currently available.

Finally, there is always the possibility of using ordinary taxable investments. While this alternative may not sound very attractive on the face of it, it could be the best approach for many parents. Certainly individual tax circumstances must be carefully considered for this to be advantageous, and the ready availability of liquid cash reserves needs to be established. Additionally, the investments used must be selected carefully for optimal tax-efficiency. But, the unlimited control and flexibility of this approach represent still another bonus in its favor.

While there are quite a few choices available from which to choose, by far the most important concepts to remember are to start a funding program as early as possible, and to consistently and faithfully make the contributions. Only then will the "magic of compounding" truly help in achieving your college funding goals.

"CLUB NED" continued from page 1

powerful voice is one of the most recognizable in the Northeastern District. Al has sung in various quartets over the years including 1987 district champion, From The Heart. Al also sings with the 1999 NED chorus champion, the Nashua Granite Statesmen.

Ken Kopka- Bass

Ken is the older member of the Club, but that is never an excuse for this fun-loving bass. Ken has sung in numerous district finalist quartets. Among them are Potential Favorites and Men From Earth. It has been said that Ken has one of the most resonant speaking voices on record. This is a tribute to his deep and resonant bass singing ability.

Steve Tramack- Baritone

Steve is listed last, and rightly so. He sings baritone, the left over notes. What Steve is not last at, is his dedication to both quartet and chorus. He directs the 4-time and current NED chorus champions, Nashua Granite Statesmen, and has become one of the most respected coaches in the NED, Harmony Inc, and SAI-region 1. Steve is the musical genius in the Club and frequently coaches and "re-arranges" from within the quartet.

To make reservations and a dinner choice for the PES Annual Banquet, call Dot Sadowski at (401) 434-2332 or make reservations online at the PES Website located at www.provengsociety.com.

Dinner choices for the banquet include Roast Prime Rib Au Jus, Chicken Piccata, and Grilled Swordfish.

The cost for the banquet is \$45.00 per person. Tables of 10 are also available for corporate groups. Call the PES Office for details.

Next Time You Need A Date, Visit the PES Online Calendar

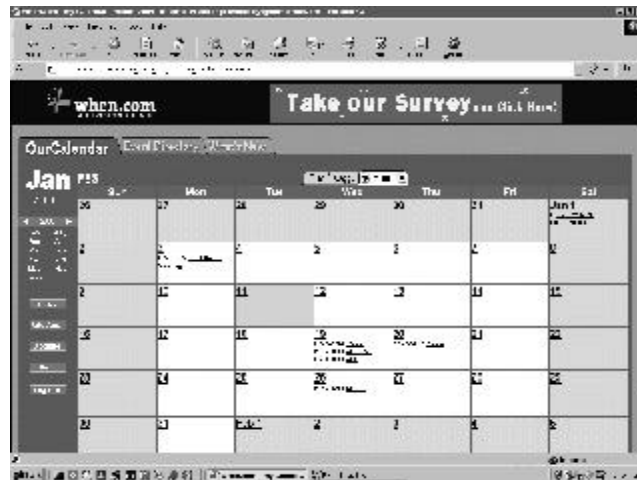
by Roy L. Bouvier, Editor/Publisher of *Engineering*;
President, Providence Engineering Society

If you're wondering when your next society meeting is scheduled, wonder no more. The Providence Engineering Society's new online calendar will give you all the info you need to know about upcoming events. The PES Online calendar can be accessed through any computer with an internet connection. To reach the calendar, simply enter the address <http://www.when.com>. When you reach the home page of the when.com site, enter the login name "pes_events" (without the quotes) and the password "pes2000" (again no quotes).

Once the login name and password are entered, simply click on the button labeled "Go to My Calendar". This will take you to the PES Online calendar where you can view all the scheduled events by day, week, or month view. To view the details behind an event, simply click on the date. A window will open showing you all of the pertinent details.

You can also access the PES Online Calendar through the PES Website, just click on the button labeled "Calendar".

So, the next time you need a date, visit the PES Online Calendar.



"DILBERT" continued from page 4

change her burial to Friday. He said, "That would be better for me." (Shipping Executive, FTD Florists)

10. We know that communication is a problem, but the company is not going to discuss it with the employees. (AT&T Long Lines Division)

11. We recently received a memo from senior management saying, "This is to inform you that a memo will be issued today regarding the subject mentioned above." (Microsoft, Legal Affairs Division)

12. One day my boss asked me to submit a status report to him concerning a project I was working on. I asked him if tomorrow would be soon enough. He said, "If I wanted it tomorrow, I would have waited until tomorrow to ask for it!" (New Business Mgr., Hallmark Cards)

13. As director of communications, I was asked to prepare a memo reviewing our company's training programs and materials. In the body of the memo one of the sentences mentioned the "pedagogical approach" used by one of the training manuals. The day after I routed the memo to the executive committee, I was called into the HR Director's office, and was told that the executive VP wanted me out of the building by lunch. When I asked why, I was told that she wouldn't stand for "perverts" (pedophiles?) working in her company. Finally he showed me her copy of the memo, with her demand that I be fired, with the word "pedagogical" circled in red. The HR Manager was fairly reasonable, and once he looked the word up in his dictionary and made a copy of the definition to send to my boss, he told me not to worry. He would take care of it. Two days later a memo to the entire staff came out, directing us that no words which could not be found in the local Sunday newspaper could be used in company memos. A month later, I resigned. In accordance with company policy, I created my resignation letter by pasting words together from the Sunday paper. (Taco Bell Corporation)

14. This gem is the closing paragraph of a nationally-circulated memo from a large communications company: "Lucent Technologies is endeavoring to promote constant attention on current procedures of transacting business focusing emphasis on innovative ways to better, if not supercede, the expectations of quality!"

Fenton G. "Lefty" Keyes, longtime PES member, dies at 83

Builder Fenton Keyes left mark across R.I. landscape, dies at 83 FENTON G. "LEFTY" KEYES, 83, of Twin Oak Drive, Warwick, a professional engineer and retired senior partner of the architectural and engineering firm Keyes Associates of Providence, died Friday at Beechwood at Laurelmead, Providence. He was the husband of Gertrude (Miller) Keyes for 64 years.

Mr. Keyes was a 1939 graduate of Northeastern University, Boston, Mass., where he was an outstanding athlete in both baseball and basketball. He later served on the board of directors for many years for the corporation of Northeastern.

During World War II, he was an officer with the Navy Seabees in the Pacific Theater.

In 1951, he founded Keyes Associates, a company which has designed more than 4,000 projects including the Fox Point Hurricane Barrier in Providence, Route 91 in Vermont and the Connecticut River Flood Control Project for the Army Corps. The company, which eventually opened offices in Massachusetts, New Hampshire and Connecticut, designed numerous buildings including facilities at the University of Rhode Island, Roger Williams University, Rhode Island College, Harvard University, Brown University and Northeastern University, as well as buildings in almost every community in Rhode Island. It also designed buildings for corporations such as Polaroid and Raytheon. Keyes Associates also performed work in Africa during the 1980s as Keyes International.

Mr. Keyes served on the board of directors of Southern New England AAA and was an active member of the Greater Providence Chamber of Commerce and the Providence Rotary Club. He was past president of the Warwick Country Club. He was also past president of the Rhode Island Chapter of the American Society of Civil Engineers, as well as a national board member.

He also supported numerous charitable causes, serving as chairman of the John Fogarty Foundation from 1965 to 1983, where he worked with the late senator to establish the John Fogarty Foundation for Retarded Citizens in Providence. He spearheaded the annual Boys & Girls Club Camp Davis Golf Tournament. Keyes served on the board of directors from 1971 to 1997 when he was elected chairman of the board. Through his work, the Boys & Girls Club raised more than \$500,000. He also served on the board of directors for the Heart Association of Providence, Kent County Memorial Hospital, St. Joseph's Hospital and Roger Williams University.

Born in Waltham, Mass., Mr. Keyes was the son of the late George and Lettie Keyes. Besides his widow, he leaves two daughters, Sandra L. Dailey of Saunderstown, and Judith V. McLaughlin of Warwick; a brother, Walter Keyes of Brent Rock, Mass.; a sister, Virginia Colborn of Momence, Ill.; five grandchildren and nine great-grandchildren. He was also the brother of the late Leonard Keyes, Dorothy Anderson and Natalie Gross.

Textron, In New Venture, Hopes To Spin Wide Web

Providence Journal staff and wire reports

PROVIDENCE — Textron yesterday announced that it is investing \$100 million in Safeguard Scientifics and will use its new partnership as a springboard for a range of new E-commerce strategies.

Safeguard, of Wayne, Penn., is a venture-capital company that invests in Internet businesses. As part of the deal, Textron will get access to the 250 Internet-related companies that Safeguard has invested in, such as Cambridge Technology Partners Inc. Safeguard also will work with Textron's businesses.

Brian Sullivan, a spokesman for the Providence-based Textron, said that the partnership will enhance not only future sales and marketing efforts but also such areas as procurement, design and engineering, plus various administrative and accounting procedures.

Sales of goods and services over the Web are forecast to rise more than ninefold to \$184 billion in 2004 from \$20.2 billion last year, Forrester Research Inc. said in September.

Sullivan said that Textron will not be limited to using Safeguard, but through this investment will be able to take advantage of the company's E-commerce expertise.

"This alliance will give us access to the most advanced and emerging E-business solutions, enabling us to accelerate the process of identifying and implementing the best technological solutions for our business needs," said Lewis B. Campbell, Textron chairman and chief executive officer.

Based near Philadelphia, Safeguard said it agreed to sell \$100 million in stock to Textron, which amounts to about 2 percent of its ownership. The company will sell about 727,000 common shares for \$137.50 each, its closing share price on Dec. 17, to Textron for \$100 million.

Safeguard invests in companies that fall into three markets: electronic commerce, electronic business software and services, and electronic communications. Companies that Safeguard has invested in that may have initial public offerings range from eMerge Interactive Inc., which helps sell cattle on-line, to Opus360, which links technology workers with employers.

PE's Reflect on a Century of Achievement

By David Siegel, Associate Editor, NSPE Engineering Times

Is it Citizen Kane or Casablanca? Muhammad Ali or Michael Jordan? Ulysses or The Great Gatsby? With the 21st century on the horizon, everyone's making their lists of greats, and engineers are no exception.

NSPE recently took an informal survey of its members to find out what they think is the greatest engineering feat of the century. Other engineering associations have done the same in a coordinated effort to help the National Academy of Engineering determine a list of greats to be announced on February 22 during National Engineers Week.

As we go rushing into the 21st century, it's refreshing to pause, look back, and survey where we've been. Henry Petroski, civil engineering professor at Duke University and author of *To Engineer is Human*, *The Pencil*, and other books, looks back to his grandparents who grew up in Pennsylvania in the late 1800s—no running water, no sanitary sewers, no central heat, no central air, nor any of the other products of engineering we take for granted today.

"The benefits of engineering are nothing new, just different with each era," Petroski says. And looking back is a good exercise in appreciation. "It puts in perspective how much engineering has contributed to our quality of life."

What do NSPE members have to say about all this? For those who cast votes, the answers are many. They range from the expected—airplanes, interstate highways, and integrated circuits—to dark horses like the Galveston Seawall and the Central Arizona Project. And don't forget the votes for the twist-off beer bottle cap and the Thermos—"It keeps hot things hot and cold things cold, but how does it know?"

For NSPE members who responded to "the greatest" question, one engineering feat stood out. The votes were often marked with confidence. "No question in my mind." "Without a doubt." "What else can ever compare to that?" "It has to be." "Hands down." The Apollo program—it evoked that kind of praise.

If you ask NSPE members T. James Cokonis of West Chester, Pennsylvania, Beth Todd of Tuscaloosa, Alabama, or go to Capitol Hill and ask Texas Congressman Joe Barton, Apollo is it. The race to the moon put engineering front and center.

After earning degrees in aeronautical and mechanical engineering, Cokonis went to work for General Electric, which served as the prime systems integration contractor for Apollo. He calls the program that put a man on the moon "an epic in human evolution." Apollo raised the public profile of engineers, created a patriotic collaboration between industry and government, and changed the way we view planet earth.

In retrospect, Cokonis says the Apollo program summed up the engineering century. "Engineers were at the top of the heap. It was a glorious time for engineering," he says. "I feel fortunate for having been alive as a practicing engineer during that time."

Todd, an assistant professor of mechanical engineering at the University of Alabama was nine when the Eagle landed. She remembers the landing, but fell asleep before Neil Armstrong hopped out onto the moon's surface. Today she does research at NASA's Bone and Mineral Physiology Laboratory on the design of exercise devices that will work in weightlessness.

Like many others, Todd points to the collaboration of engineering disciplines and the spin-off technologies as the factors that make Apollo the greatest of the century in her mind. "It was one of those projects that when it started," she says, "a lot of people said it

would never happen."

"Clearly Number One"

Robert Benningfield and Larry Schmaltz are equally confident in their votes for the century's greatest engineering achievement. Both voted for inventions that form the foundation of our electronic age—Benningfield for the integrated circuit and Schmaltz for the microprocessor.

The development of the integrated circuit can be traced to electrical engineer Jack Kilby, who realized in 1958 that all parts of a circuit, not just the transistor, could be made of silicon. Kilby's breakthrough led to the development of the first "solid circuit," which was the size of a pencil point.

Benningfield, who has worked in Raleigh, North Carolina, on the design and development of electrical circuits for eight and a half years, believes Kilby's invention is clearly number one. "All modern electrical equipment is based on it," he says. "None of it would be possible without the integrated circuit."

The downside of the integrated circuit was that it could not be programmed and could perform only the single function for which it was designed. The introduction of the microprocessor in 1971, however, helped take electronics to the next level. Relying on integrated circuits and instructions stored on memory chips, microprocessors drive our computers, microwave ovens, power plants, cars, building systems, and other electronic devices. "I don't think there's anything, bar none, developed in this century that has effected so many people," says Schmaltz, an environmental engineer in Tampa, Florida. "It has pretty much changed everyone's life."

The Common Man Vote

Another life-changing engineering feat receiving its share of votes got its start two years before Kilby's "solid circuit."

turn to "PE's REFLECT" on page 12

"PE's REFLECT" continued from page 11

In June 1956, President Dwight Eisenhower signed the Federal-Aid Highway Act, establishing the U.S. Interstate Highway System. The more than 42,000 miles of highway has, quite literally, helped drive America's prosperity, and by some accounts, it has returned \$6 in economic productivity for every \$1 it cost to build.

The asphalt of the U.S. interstates may lack the glamour of Apollo, but it is certainly an engineering marvel. When John Nawn, director of transportation engineering for Valley Forge Laboratories in Devon, Pennsylvania, cast his vote for the U.S. Interstate Highway System, he says he was doing so from the "common man perspective." Apollo certainly was an enormous feat, but Nawn sees Apollo more as great science than great engineering.

"I think the interstate system effects the common man more than Apollo," says Nawn. "Engineering is what you deal with every day, and the interstate is more on an engineering level. When I build a new lane of interstate highway, there's a direct, instant benefit to anyone on the roadway."

Local Talent

Other NSPE members, like Brenda Donaloio and Grant Anderson, cast their votes for engineering achievements with local flavor. Their votes, because they were not typical or obvious, show just how deep the field of engineering achievement really is.

Donaloio, a PE for Pennzoil-Quaker State in Houston, voted for the Galveston Seawall in Galveston, Texas. In 1900, a hurricane hit Galveston killing more than 6,000 people. It remains the greatest natural disaster to ever strike the U.S. In the aftermath of the hurricane, city and county officials decided to build the seawall to help prevent a similar tragedy in the future. The seawall stands 17 feet high, extends more than 54,000 feet, and weighs in at about 20 tons per linear foot. The last section was completed in 1962.

As well as building the seawall, the city also raised the grade of the island from an original elevation of five feet above mean low tide to approximately 22 feet along the seawall and eight feet along the bay. Together, the two engineering feats, Donaloio says, have saved not only Galveston, but enabled the development of the entire Galveston-Texas City-Houston area. Besides, she adds, "I live behind the seawall, so I have a vested interest in it."

Anderson, city engineer for the city of Glendale, Arizona, cast a vote for an engineering project with an equally profound impact on residents of a particular region—the Central Arizona Project. The 336-mile long system of aqueducts, pipelines, tunnels, and pumping plants brings Colorado River water to farms and cities in central and southern Arizona.

The \$4 billion project received the go-ahead from President Lyndon Johnson in 1968. Construction began in 1973 and was completed 20 years later. "I appreciate the space program and the [computer] chip, but this is one that brings life to the desert and is something different," says Anderson. "It's an amazing one."

As we look back over a century's worth of engineering achievement, deciding what is "the greatest" can seem almost unfair. After all, there are so many amazing ones: the Golden Gate Bridge, CAT scan, electric power generation, fiber optics, lasers, satellite technology, the Hoover Dam, nuclear power generation, the Panama Canal, the Channel Tunnel, television. . . . And the list goes on.

At best, voting for the best provides a snapshot of what engineers were thinking in 1999 and hopefully a sense of appreciation and accomplishment. It's a snapshot that reveals no hard and fast truths, save one—it was an amazing engineering century indeed.

A Word From Engineering Writers

Engineer-authors Samuel Florman and Henry Petroski both spend a lot of time thinking about engineering in "the big picture," and each has his own interesting thoughts as the century closes out.

Samuel Florman, P.E., NSPE

Florman, author of such books as *The Introspective Engineer*, *The Existential Pleasures of Engineering*, and *Blaming Technology*, says he has to ignore his personal bias toward civil engineering when it comes to voting for the feat that has had the most impact on quality of life. "Something to do with electricity," he says. He picks the 1903 introduction of the first high-speed alternator, which later was installed at power stations around the world. "There's nothing to compare, I think, to the distribution of electricity to large numbers of people."

Second place? The triode vacuum tube in 1906 by Lee De Forest. "It was the beginning of amplification, which was the beginning of radio communications," he says. "Air conditioning is another one that struck me."

Henry Petroski, P.E.

Petroski, author of *To Engineer is Human*, *Engineers of Dreams*, and the recently released *The Book on the Bookshelf*, says it's a tough call. "I wouldn't say it's absolutely number one, but something that always comes to mind is air conditioning."

Petroski, a professor at Duke University in Durham, North Carolina says AC has enabled southern cities to grow in ways that probably would have been impossible without air conditioning. "It certainly is comfortable to sit in a climate controlled office or house when it's 100% humidity outside. It's hard to imagine what it was like without air conditioning."

What about the Apollo program? Petroski believes Apollo certainly showcases engineering, but he's unconvinced when people talk about Apollo's spin-offs. "The spin-offs may have come to us via a different route," he says. "It's not at all obvious to me that we absolutely needed Apollo. To get what spin-offs—Tang? It's something we could live without. I know I could. I don't particularly like the taste of Tang."

NSPE Members Revisit the Engineers' Creed

By Rachel Davis, Staff Writer, NSPE Engineering Times

When engineers broach issues they're concerned about at NSPE chapter meetings, the Engineers' Creed is not usually riding high on the "hot topic" list. In fact, several state society executive directors say that not a single engineer has ever posed them a question about the Engineers' Creed.

But that doesn't necessarily mean that the Creed is dead. "Personally, I have a copy of it in my office, [and I] keep a copy of it in my car and my briefcase," says Illinois Professional Engineer Kathryn Gray. "The Engineers' Creed goes beyond a job in engineering, beyond a career. It is an excellent reminder of my duty to my profession and our society." The Creed is also posted in her workplace, GrayTech Software Inc. As president of the company, Gray says, "All who work here know it is our way of doing business."

The Creed remains a valued symbol of personal responsibility to many PEs, some of whom would like to see it used more often and with higher visibility. And although many engineers think the Creed should be preserved in its original form, others think it needs a few revisions to make it more relevant and appropriate in today's society.

Quick history lesson: The Engineers' Creed was developed in response to PEs' request for a statement of philosophy of service, similar to doctors' Hippocratic Oath, that could be used in ceremonies or for recognizing individuals. NSPE approved a revised version of the Engineers' Creed in June 1954 and reproduced it in a format for framing and as a wallet-sized card.

Today, most of the state societies and chapters use the Creed as part of their officer installation ceremonies, according to the guidelines laid out in NSPE's leadership handbook. The Creed is also recited by national officers at their installation ceremony during the NSPE Annual Convention.

In addition, many NSPE groups use the Creed in licensure certificate presentations to new PEs during National Engineers Week award luncheons, publish it on their Web sites or with magazine ethics features, post a framed copy on the wall, or include it in an annual directory. The California Society prints the Creed on heavy, beige-gold "parchment" paper and distributes it with CSPE's new-member packet.

Some state societies, such as the Minnesota SPE, use the Creed in their Order of the Engineer ceremonies at universities or society meetings. MSPE National Director and Professional Engineer Lisa Lee, who led an MSPE-sponsored ceremony for engineering graduates at the University of Minnesota Duluth last spring, says that holding a formal event for students with parents and guests present really makes saying the Creed an important part of the career growth process. It's also a good opportunity to encourage students to pursue a career track that leads to licensure, she says.

As engineers consider ways of drawing more attention to the Creed, others think that the Creed might be revised somewhat first. "I think that 'laws of man' should be changed to 'laws of humankind' or some other [gender-neutral] term," says Jill Swaynos, civil engineering graduate student and president of the University of Kentucky student chapter. "Also, 'need for Divine Guidance' may be okay, but again, I know people who are often careful with such phrasing so as not to offend anyone." Others believe that the phrase "place service before profit" is tantamount to a vow of poverty and should be reworded to emphasize quality of service to clients that leads to respect—and profit—for engineers.

Many PEs would like to keep the Creed in its current form, and whether or not changes are recommended, most engineers seem to have a deep appreciation for the underlying virtues of the Creed.

"I like the simplicity and straightforwardness of the Creed," says Professional Engineer R. Bruce Taylor, this year's NSPE Award recipient. "It's an elegant statement

of values and purpose, and that's what it should be." He adds that NSPE should give the Creed a higher profile. "Engineers should be made to reflect on what it really means, because that is how they're expected to conduct themselves," he says.

John McEvoy, Professional Engineer and past president of the Georgia Society, says that he regularly discusses the Engineers' Creed with his engineering staff at the Natural Resources Conservation Service USDA, giving the Creed a higher profile in his workplace.

California Society Past President Floyd Summers is one PE who took the time to reflect and write out what each line of the Engineers' Creed means to him. Under "To participate in none but honest enterprise," he writes that the attitude of the contemporary world is increasingly "all I need is a better lawyer than the other guys." He continues, "Fortunately, on engineering projects, there is no compromising the physical laws of nature, so there is no cheating; if there is, it will show up in a failure and someone will get hurt. . . . Your own conscience tells you what is honest, and you are your own judge while your life is in your control."

And in the end, as many PEs will tell you, it's this kind of individual, professional responsibility that makes the Creed more than words on paper.

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

turn to "CREED" on page 14

The Engineering Genius History Forgot:

John F. Stevens and the Building of the Panama Canal

WASHINGTON - He was responsible for the design, engineering and success of one of the world's most remarkable and important civil engineering projects, the Panama Canal, but few have ever heard his name.

Grade school history books and American folk lore credit three men for building the legendary Panama Canal: President Theodore Roosevelt, Colonel George W. Goethals and Colonel William C. Gorgas, all of whom were instrumental in building the canal. But it was the canal's second chief engineer, John Frank Stevens who improved the working conditions, and devised and championed the lock system and excavation plan that would successfully link the Atlantic and Pacific Oceans.

Rugged, direct and decisive, Stevens was not one for self-promotion; and by many accounts the lack of public recognition for his achievements was largely his own doing. However, Roosevelt is as much to blame for history's strange neglect of this engineering genius.

The Panama Canal had been the dream of the French and Spanish since the 1500s. But French efforts to build a sea-level canal proved unsuccessful and the French abandoned the project in 1889. Recognizing the growing importance of the canal for trade and military purposes, Roosevelt took up the challenge and started construction in 1904. Despite his orders to "make the dirt fly," in little over a year the project was stalled.

Roosevelt's appointed Canal Commission could not agree on a plan; and there were inadequate tools and equipment, atrocious working and living conditions, and low worker morale. Then in June 1905, the chief engineer, John F. Wallace, suddenly resigned, mostly for fear of Yellow Fever, which had infected 134 people and caused 34 deaths on the canal.

Roosevelt was furious. The project seemed doomed, and with public opinion waning, Roosevelt immediately began the search for Wallace's successor. This led him to Stevens, whom railroad magnate James J. Hill and others recommended as the "best engineer in America."

Like most engineers of his time, Stevens did not have any formal engineering training, and gained his knowledge by building railroads. Born in 1853 and raised in West Gardiner, Maine, Stevens ventured west in 1873 to Minneapolis where he worked as a rodman. A few years later he left for Texas to drive spikes and later to conduct route surveys for the Sabine Pass and Northwestern Railway.

Stevens went on to work for Hill from 1889 to 1903, and to become chief engineer and general manager of the Hill-owned Great Northern Railway, considered the best engineered railroad at the time. He also became a legend for finding the lost Marias Pass through the Rocky Mountains and another pass through the Cascades, which — against his wishes — was named after him.

When Roosevelt asked him to become the second chief engineer of the Panama Canal in 1905, Stevens, then 52, was vice president of the Rock Island Railroad in Chicago and had just accepted a job to head a commission to build railroads in the Philippines. Persuaded by his wife, Harriet, and others, Stevens instead accepted the Panama Canal appointment on the conditions that he was to "have a free hand in all matters" and would stay only until the canal's success or failure was certain, to which Roosevelt agreed. When Stevens arrived at Colon on July 25, 1905, he found it to be even worse than Roosevelt said, yet he described his challenge as "colossal but not insurmountable."

Stevens stopped what little excavation work was being conducted and focused his workers' energies on providing for their basic needs. He built shops, housing and other buildings — some 5,000 in total. He also established commissaries so workers could afford nutritious food.

Perhaps one of his most important initial decisions was to give his full support to the canal doctor, Colonel Gorgas. When others considered Gorgas a crackpot for his theory that mosquitoes were the carriers of Yellow Fever, Stevens chose to give him everything he needed to eradicate the mosquitoes. By the end of that year, there were no more cases of Yellow Fever and the Canal Zone was a model of health and sanitation.

With renewed health and morale, workers flocked to the project and Stevens turned his attention to the canal. At first he had planned to build a sea-level canal, which was what Roosevelt and official Washington had envisioned as well. But after Stevens traversed the nearly 50-mile length of the Canal Zone, he concluded that this plan would require a very deep cut that would produce uncontrollable landslides given the region's complex topogra-

phy. The other obstacles were the variations in the oceans' tides and the dramatic shifts in the volume of the Chagres River, which has been described as running from a trickle to a torrent with the seasonal rains.

Stevens devised a new plan that involved locks at each end of the canal and a massive earthen dam that would create the large, high-level Gatun Lake in between. Other engineers who had viewed the isthmus agreed that a sea-level canal was unrealistic. While Stevens was able to convince Roosevelt to adopt his plan, he had to spend months lobbying Congress to accept his new approach. At this point, Roosevelt would credit Stevens as the one "mainly responsible for the success of this mighty engineering feat."

Even with the right plan, Stevens faced major construction challenges, which were really about transportation and excavation. The canal was to run a similar route as the antiquated Panama Railroad, so Stevens modernized it to serve as a conveyor belt system to remove the excavated material. He assembled hundreds of railroad cars, compressors, drills, steam shovels, locomotives and rail cars, which removed enough earth on flat cars to circle the planet four times. Indeed, the dirt was flying.

By 1907, Stevens felt the canal had reached that pivotal point where success was guaranteed, so in a letter to Roosevelt he resigned. Roosevelt was again furious. He appointed Colonel Goethals to succeed Stevens as the third chief engineer. Goethals carried out what Stevens had planned and completed the canal in 1914. Goethals always acknowledged Stevens' contributions. A newspaper quoted Goethals in 1928 saying, "Stevens... was one of the greatest engineers who ever lived, and the Panama Canal is his greatest monument."

But Roosevelt never mentioned Stevens again, even in his autobiography when he wrote about building the Panama Canal. As a result, few publicly acknowledged Stevens' contributions to the engineering feat. However, the engineering community gave Stevens its highest honors. The American Society of Civil Engineers made him an honorary member in 1922 and in 1927 elected him president, the society's highest elected office. ASCE also honored him with its prestigious John Fritz Medal and Hoover Medal.

While his relationship with Roosevelt was never repaired, Stevens always held him in high regard. During an illness that would end his life, Stevens said to his son, John F. Stevens, Jr., "Son, the next time you come I shall not be here. On the mantel are the pictures of the only two men who ever influenced my life and I wish you to have them." The pictures were of Hill and Roosevelt.

Professional Directory

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