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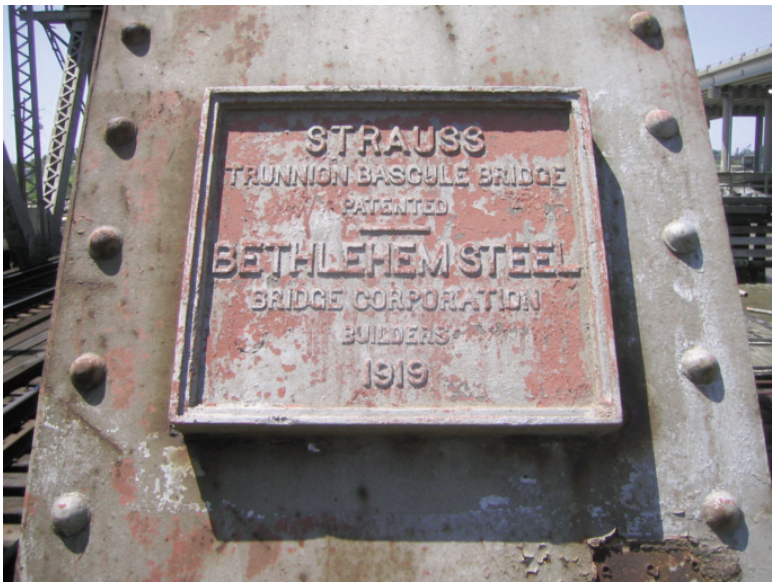
Infrastructure Replacement Needs

By: Kenneth H. Nelson, P.E.

The American Society of Civil Engineers recently issued its report card on the state of infrastructure in the United States. The grade was a disappointing D+, indicating that there is a tremendous amount of work that needs to be done. How did we get to this sad state of affairs? Well, a simple indicator of the reasons behind our local situation is that New Orleans is about to celebrate the 300th anniversary of its founding, and some of the infrastructure is just plain old. There are bridges in New Orleans that are approaching 100 years old and are still in active use, though showing their age. (They were designed by Strauss, the same engineer who did the Golden Gate bridge in San Francisco, and they are marvels of efficient use of materials and elegant function.)



Plaque from a bridge almost 100 years old that is still in daily use

In addition to age, structures in south Louisiana are challenged by the soft soils with high content of both organic material and water. As the organic material oxidizes and the soils dry out, the volume shrinks and settlement occurs, causing distress in anything supported on them. The problems this causes makes the sight of sagging buildings common, and there are companies that have been in business for multiple generations in New Orleans specializing in re-levelling structures. Another challenge to structures in south Louisiana is the high rainfall and humidity, whose corrosive effects are augmented by the high temperatures. One bridge in Louisiana was made using "weathering steel" that was supposed to save lifetime maintenance costs by avoiding the need for periodic recoating. However, after several years in our subtropical climate, the corrosion rate on the steel was found to be unacceptably fast, and the structure had to be painted anyway. Environmental concerns have eliminated the use of some of the most effective corrosion inhibiting coatings that were used in the past, and this will accelerate the deterioration of our metal infrastructure in the future. Problems with corrosion can sometimes be mitigated by good detailing of structures to minimize collection of water, but as noted in ancient texts and in the observation of natural landforms such as the Grand Canyon, nothing can withstand the patience of water. A professor who instructed our chairman in his master's program of coastal engineering had a saying that summed up the ultimate demise of structures exposed to the relentless elements of nature on the coastline. He said "People get tired, and materials get tired, but the sea never gets tired."

All design with a commercial purpose is a matter of compromise between cost and lifespan. If you really wanted something to last for the ages, you could build a pyramid of interlocking diamond blocks, but I

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doubt anyone could get the financing to do it. The famous pyramids in Egypt have lasted several thousand years built out of common limestone, which is considerably less durable and expensive than diamond, but even those structures could probably not have been built as commercial ventures. They were built essentially for religious purposes, and people will go to great lengths in the pursuit of religious objectives. We once designed a mausoleum which, it was hoped, would last for quite some time for the sake of all involved. It consisted of dense concrete walls and marble facade panels hung on brass pins. All these materials were used by the Romans a couple of millennia ago to construct buildings that are still visible in Rome today, so we felt we had a chance of meeting a reasonable life expectancy for the building at a construction cost that would not make it the exclusive resting place of kings and queens like the Egyptian pyramids.

Some of the structures that date from the turn of the 19th to 20th century were extraordinarily well designed, and they were made of good materials with good corrosion resistant coatings that have stood the test of time. They were designed using manual calculations instead of digital computers, and this limitation of computing capability made their inventors stick to basic principles of physics that bore predictable fruit. Ironically, the widespread availability of complex computing power has led some designers down the path of complicated structures that suffer unforeseen stresses and have led to unexpected failures. When the mathematical tools available limited people to making simple decisions, the performance of the structures was more predictable and they tended to last longer. Also, the corrosion inhibiting compounds used 100 years ago were in some ways superior to many in use today, albeit with the tradeoff of being more toxic.

Ultimately however, nothing lasts forever, so we must periodically replace it. We just happen to be at a point in the history of the United States when we need to replace a lot of the framework of our civilization at the same time. As taxpayers and residents of the cities where most of this rebuilding needs to take place, we are not happy about this, but as engineers, we see this as a tremendous opportunity. There are challenges to be sure, such as keeping systems running and society functioning while performing this work. Any rebuilding project that must be done within these constraints is harder and costlier than new construction on an open site. The scope of rebuilding that needs to be done nationwide is massive; and if it is not done, there will be occasional catastrophic failures resulting in disruption of the economy and tragic loss of life. We hope that the case to undertake this effort can be properly explained to the public so there will be support for doing it.

Replacing the physical assets of our civilization is one task, but replacing the human capital is just as important. We need to nurture the next generation of engineers to meet the challenges of rebuilding our world. It takes years of study and practical experience to teach the mathematical, scientific, and problem-solving skills that are necessary to be a competent engineer. Few students have the persistence to complete the basic curriculum, and few companies have the long term view to preserve the knowledge base of their engineering staff to insure their survival in the economic cycles that will inevitably occur and bring ever-changing challenges. Constantly teaching the basics and encouraging the curiosity of individuals to develop new techniques is what it takes to keep civilization advancing. We have seen periods of regression in human history before, and it is not a pretty sight. The world is littered with the ruins of ancient cultures that once flourished but failed to keep their societies healthy. The ruin of their infrastructure was a symptom of their social downfall. We all therefore must promote the preservation and advancement of our human capital as well as our physical assets.

Given enough time, even solid rock will show its age

Recent New Orleans Office Management Changes

Stephen M. Pumilia, P.E.
Engineering Manager- New Orleans office effective September 1, 2016

Steve began his career at the company right after graduating from Tulane in 1976 with a B.S. in Mechanical Engineering. His over 41 years of experience have spanned many clients. Steve has led past projects for Exxon, some of which required him to move to California for the duration of the work. He headed Shell Norco projects, and was highly lauded for work at DuPont's DeLisle plant and Freeport Minerals' Caminada reactivation. In more recent years, he assisted with projects off-site at One Shell Square, travelled to Brisbane, Australia for ExxonMobil's work in Papua New Guinea and traveled to Western Kazakhstan for CTI's Sulfur Remelt project. Steve was promoted to Assistant Vice President in 1993, was again promoted to Vice President and Manager of the Project Services Group of our Project Management Department in 2006. He became Manager of the Mechanical Department in 2011. Steve assumed additional duties as Manager of the Chemical Department in 2013 and was promoted to Senior Vice President in 2014. His experience has served him well to manage both projects and people; we appreciate his efforts and expect it will sustain him for the challenges as Manager of Engineering in New Orleans.

Richie A. Melancon, P.E.
Manager Mechanical and Chemical Engineering, effective September 1, 2016

Richie, like the Nelsons, grew up in an engineering family. It is fitting for him to fill the position held by his father, Jim Melancon, who was Manager of Mechanical Engineering from 1989 to 1991. Richie worked part-time at our firm while studying at the University of New Orleans. Following graduation from UNO with a B.S. in Mechanical Engineering in 1997, he worked for several years at a local company specializing in the manufacturing of industrial radiography equipment. Diverse duties there honed his design engineering skills as well as sparking his management skills. He was an ideal candidate to join NELSON, hiring on in 2000 as an Engineer 2. Richie wasted no time in pursuing his P.E. license, passing the exam in 2002. He continued up the ladder, serving major clients in oil and gas facilities projects, compressor stations, as well as pipeline work. Willing to "go the distance", Richie spent time overseas in Equatorial Guinea earning kudos for his work. He attained the position of Staff Engineer in 2010 and was promoted to Assistant Vice President in 2012. Richie is serving his second two year term on the UNO International Alumni Association Board of Directors as the College of Engineering Representative. His twenty years experience in his profession pave the way for a successful path forward in his new position.

Thomas W. Wells, P.E., S.E., P.Eng.
Manager Business Development, effective April 1, 2017

Tom Wells earned a B.S. in Civil Engineering from the University of Florida in 1965 and began his career with an engineering firm in Florida until leaving to join the service. Tom was a commissioned officer in the U.S. Coast and Geodetic Survey out of Norfolk, Virginia. He returned to school to earn a Masters Degree from the University of Illinois and later earned an MBA from Loyola University. Tom joined NELSON in January of 1976, was promoted to Assistant Vice president in 1981, to Vice President in 1985 and Senior Vice President in 1992. Recognizing his loyalty and engineering excellence, on August 1, 1990, Tom was named Manager of our Civil Engineering Department, chairing that position for twenty-seven years, as well as taking on the additional duties for oversight of the Environmental Department in 2011. Tom's enthusiasm for engineering is a credit to our firm and the profession; this is backed up by his civil and structural professional engineering registrations in thirty-four states domestically as well as Alberta and Ontario, Canada. Tom is a longtime member of the Louisiana Engineering Society, American Concrete Institute, Society of American Military Engineers and the American Society of Civil Engineers who presented him with their Lifetime Achievement Award in 2012. His outstanding fifty-two years of vast project experience and interface with many clients made Tom an ideal choice to become Manager of Business Development. Building on existing relationships, he is well poised to represent the firm's capabilities as he devotes himself to seeking new projects for our talented staff.

William E. Rushing, Jr, P.E.
Manager Civil & Environmental Engineering, effective April 1, 2017

Bill Rushing received his B.S. in Civil Engineering from Louisiana State University in 1981. He started at NELSON in July of 1981, quickly earning the respect of his peers and clients alike. Over the course of his career, Bill's assignments have included project management and lead engineer for design of numerous industrial and marine facilities, including container marshalling yards, chemical plants, oil storage terminals, oil and gas production facilities, bulk storage facilities, hard rock mine ore processing facilities in Indonesia, and much-needed paving improvements right here in New Orleans. Bill was promoted to Assistant Vice President of the firm in 2006 and to Vice President in 2011. In 2012, he was elected to a two year term as Vice President of the American Concrete Institute (ACI), and he began another one year term as President of ACI in 2014 during which he travelled worldwide representing that organization. Also in 2014, he was inducted into the LSU Civil and Environmental Department Hall of Distinction. Bill has travelled overseas on behalf of the company and has also worked in several states domestically and on offshore projects in the Gulf of Mexico. His proven leadership skills will serve him well as Manager of our Civil and Environmental Department.

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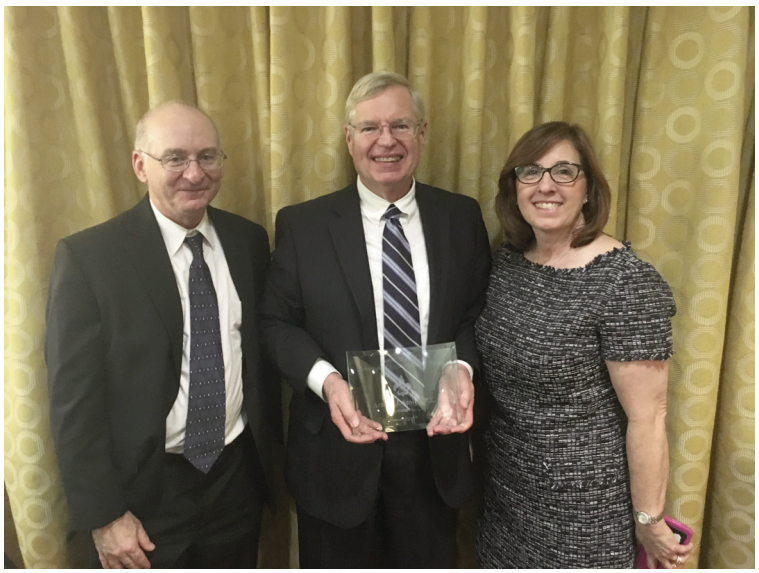
Arthur J. Smith, III, P.E. - Awarded The James M. Todd Technological Accomplishment Award



Roy Phelps, P.E. New Orleans Chapter President, LES, Arthur J. Smith, III, PE., and Brenda Smith

Arthur Smith, Senior Vice President and Manager of Electrical Engineering in our New Orleans office, was selected to receive the Louisiana Engineering Society's 2017 James M. Todd Technological Accomplishment Medal.

This award is given to an engineer for distinguished service in the field of technological advancement or discoveries.

Arthur accepted the award at the LES Honors and Awards Luncheon held in Lafayette, LA.

Congratulations Arthur!