Our Infrastructure Is a National Treasure!

Every time my wife and I travel through Europe on vacation, it is inevitable that half of the cathedrals we visit are shrouded in scaffolding as part of a major repair and rehabilitation effort. These structures are hundreds of years old and are considered to be national treasures. Ever think that infrastructure is also national treasure? Certainly life would be poorer without our bridges, tunnels, highways, sewers, water mains, harbors and airports. Not many people other than civil engineers would ever think of a sewer as a national treasure, but maybe that is the proper context for the huge investment we as a nation have made over the past decades. As a sampling, in the Boston area, well over $25 billion was spent over the past twenty years on just a few projects (Big Dig, Logan Airport, MWRA's Deer Island, new water treatment, new pipelines and MBTA commuter rail). That sort of expenditure certainly qualifies those infrastructure projects as national treasures! What about all the other infrastructure systems built over the past century and that are still in vital use? These precious, vital treasures that keep our modern society running are together worth many trillions of dollars!

But what do we do with our new treasures? We largely ignore them. Maintenance is not headline-grabbing news the way opening a new highway tunnel or bridge is. When state and city budgets were flush in earlier years, did we repaint our bridges? Ha! The Longfellow Bridge has not been painted for over fifty years! Certainly there were a few good years in that time. But now with budget deficits requiring expenditure cuts in nearly every state, most cities and, of course, the federal government, it seems that our long-neglected public infrastructure is becoming the elephant in the living room. How long can we as a society continue to ignore it? The answer is that we can't anymore.

BSCES President Danielle Spicer's message to the BSCES membership in a recent *BSCES Newsletter* discussed the issues of our deteriorating infrastructure. We have all heard that ASCE has given America's infrastructure a grade of D on its 2009 report card. I am afraid, however, that our elected officials, who have the responsibility of authorizing the funding for major infrastructure projects and setting national priorities, will take the same view of that grade as some of my students and say that "a D is still passing, so what's the problem?" Just how far is it from the D on the ASCE infrastructure report card to the feared F? A student failing a course in college is a lot different than having a bridge over a river fail! Remember, the I-35 bridge in Minneapolis was thought to have another ten years of useful life when it collapsed in 2007. That bridge collapse should have been a national wake-up call, but have we simply pushed the snooze button?

Our national treasure infrastructure is in crisis, and needs strong leadership and active support to reverse the trend of stretching the last breath of useful life out of these systems with lower

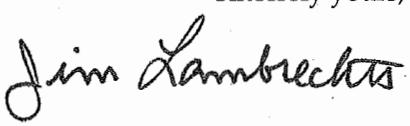
and lower expenditures. The cost to rehabilitate a bridge increases by a factor of 5 for each successively lower serviceability grade. Why do we permit our bridges to rust away and the concrete to deteriorate and spall off to expose rebar? Maybe it has been decided that the original outer layer of rebar really wasn't necessary? Come on, civil engineers know better than that. We must harken to the call of our decaying infrastructure, and get involved in the process. Our professional responsibility requires us to be innovative and creative on project work, and design sustainable systems. We must become more pro-active in lobbying for the programs and funding needed to repair, rehabilitate and rebuild our national treasures. We all have to educate the general population on the dire consequences of delayed maintenance. It will cost so much more to rebuild it in the future if we do not repaint it today! Talk about a debt being passed on to future generations. Add several trillion dollars for rebuilding America's infrastructure onto the $14 trillion and rising national debt. Civil engineers must be involved throughout all phases of infrastructure repair, renovation and replacement.

It is appropos that infrastructure maintenance and rehabilitation measures are the two technical topics in this edition of *Civil Engineering Practice*. In his thorough report on the Storrow Drive underpass tunnels, Michael McCall chronicles the problems that stemmed from the tunnels' original design and construction, and which have continued to plague the tunnel throughout its nearly sixty-year life. The serious problems identified in tunnel inspections and condition assessments have been addressed with the recently completed repairs, which added five years to the life of this important transportation link. In several instances, the construction processes actually used were a collaboration with the project civil engineer. However, the story of the Storrow Drive underpass is far from over. These repairs only bought five years' time. What's next? The clock is running. Societal and political arguments and decisions have to be made. The time is opportune for civil engineers to get involved in the process of setting the future course for this transportation link.

Our second article by Iplikcioglu, Lin, Soleimani, Svetieva and Zhao reports on chloride contamination of reinforced concrete — its origin, detection and prevention. Concrete is a major component of infrastructure, and everywhere we travel, the deterioration of concrete is apparent. Several methods of detection investigation and subsequent rehabilitation, as well as methods to mitigate future deterioration, are presented — all have application to current and future rehabilitation of the concrete elements in our decaying infrastructure.

So as you journey around the country, pay close attention to our aging and poorly maintained national treasures. And keep those water and sewer pipes in your thoughts, too. Our infrastructure is worth trillions of dollars. We must keep up with its maintenance, or watch as it slowly decays. And as you watch out for decaying concrete and steel, watch out also for timely, practice-oriented topics on maintaining other parts of our aging infrastructure or other intriguing practice issues in civil engineering today. Perhaps you have worked on such a project, and would want to write a short technical piece, or maybe you can point the Editorial Board in the direction of another member who might be more appropriate to write about it. Please contact me or any member of the Editorial Board with ideas, suggestions or draft papers on an aspect of civil engineering practice that you would like to see in your BSCES journal.

Sincerely yours,



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