

Illinois Section

INSIDE:

President's Notes

2

Pothole Land

3

Illinois ASCE Report Card Effort

5

News & Secretary Report

10

Section Activities

11

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For details email Brian Pawula, Director of Advertising, at <u>brianp@thomas-engineering.com</u>



The San Francisco-Oakland Bay Bridge

By Jan S. Plachta, F. ASCE

The San Francisco-Oakland Bay Bridge is considered to be one of the most impressive engineering structures in the United States. The American Society of Civil Engineers has recognized the bridge as the 7th Engineering Wonder of the World. This project was completed by a California Department of Transportation engineering team led by Charles Purcell. Purcell had no experience in the design of large bridges so he turned to some of the best known and most experienced bridge engineers in the country. Some of these engineers were

Ralph Modjeski, Leon Moisseiff, and Daniel Moran with Ralph Modjeski being nominated as Chairman of the Board. Modjeski is considered to be the mastermind of the Bay Bridge. Built between 1933 and 1936, the Bay Bridge is a world record measured by the ratio of design and construction time against cost. The pace of construction is almost unthinkable today.

Basically the bridge consists of two segments: the West Bay Crossing, and the East Bay (continued on page 8)



The workhorse of the Bay-286,000 cars daily

President's Notes Patrick Lach, P.E.



(<u>http://www.isasce.org/index.php/report-card/</u>). Since we, as civil engineers, are stewards of the State's infrastructure, we have the responsibility to



Phone: 1-800-548-ASCE Web Site: <u>www.asce.org</u> periodically assess the state of infrastructure, report on its condition and performance, and advise on the steps necessary to improve it.

Illinois has made some slow progress with an improvement in our State's infrastructure grade to a C- from a D+ in 2010. The current grade is still unacceptably low but it shows that where there is investment, there can be improvement. There were three categories with improvements: Rail, Drinking Water, and Roads. All of these grades improved by varying levels and sources of investment which are further detailed in the full report card on our website. Again, I would like to thank all those that assisted with the preparation of the Report Card, the press conference and the legislative drive-down.

The Report Card has received its fair share of media over the last couple of months with live interviews with Section members on radio and television, newspaper and magazine articles

The Report Card has received its fair share of media over the last couple of months with live interviews with Section members on radio and television, newspaper and magazine articles, as well as letters to the editor. A small sampling of the media includes Crain's Chicago Business, NBC 5 Chicago, WBEZ National Public Radio, Chicago Magazine and many others. Over the next few months, we are hoping to We must invest in infrastructure systems that will lessen the costs of doing business in Illinois and improve the economy. 2014 is a major election year and we, as civil engineers, need to ask those running for political office what their infrastructure vision for Illinois encompasses.

continue to shine a light on our infrastructure through additional media outreach and presentations. If you are interested in helping us out, please let us know!

We need to continue to ask our political leadership and the public to take on three key solutions to improve Illinois infrastructure. The first is to create a long term sustainable funding mechanism to maintain and upgrade our infrastructure systems. The second is for all partners to work together to create smart, efficient and resilient infrastructure systems that can meet the current and future needs of Illinois and its communities. Lastly, we must invest in infrastructure systems that will lessen the costs of doing business in Illinois and improve the economy. 2014 is a major election year and we, as civil engineers, need to ask those running for political office what their infrastructure vision for Illinois encompasses.

The Section has been busy with a variety of other activities. The annual President (continued on page 7)



Pothole Land

By Robert Brzezon

Potholes are a nuisance to drivers everywhere. Hitting a pothole traveling at 25 mph causes your stomach to drop suddenly much like the bottom of vehicle as the suspension reacts to this sudden change in road condition. After a quick damage assessment, you're left wondering where that hole came from and what will be done to fix it. This past winter in Chicago, thousands of drivers wondered the same thing.

Potholes are the result of water entering the pavement structure. Channels are created when asphalt pavement cracks and fails. Pavement can fail and crack due to a variety of reasons such as excessive loading. These channels act as a pathway for water to enter the pavement structure. During the winter months, temperatures drop below freezing which causes the water in the pavement to freeze and expand, in a process known as frost heaving. This expansion causes the failure to expand, creating a larger channel for more water to enter and the cycle repeats. Eventually, the pavement can no longer support the loads it was



designed and constructed for. The repeated loading by trucks and city busses combined with the freeze thaw cycle reduce the pavement to basic aggregate. Finally, the aggregate particles are dissipated by traffic as there is nothing binding them together. The life of the pavement can be extended and potholes can be reduced with preventative maintenance. One of the most basic treatment options is a yearly crack sealing program.

The life of the pavement can be extended and potholes can be reduced with preventative maintenance. One of the most basic treatment options is a yearly crack sealing program. Crack sealing involves the routing of transverse and longitudinal cracks. After the cracks are routed they are blown clean and filled with a hot poured joint sealer. The joint sealer binds the crack together and forms a seal limiting the amount of water that enters the crack. Crack sealing can extend the life of the pavement anywhere from six months to *(continued on page 4)*



Pothole Land (continued from page 3)

four years. However, if the pavement has deteriorated beyond a certain point, crack sealing no longer becomes a valid option.

Weather and traffic conditions require the use of cold mix asphalt and the "throw and roll" method to temporary fill holes.

After a grueling winter, Chicago motorists are now faced with navigating city streets full of potholes and crews working to repair the damage. The record setting winter had multiple days of below freezing temperatures and the third highest amount snow in Chicago history. This led to three times the normal amount of the pothole complaints between the months of December and March. The city addressed these complaints by organizing "Strike Teams" of repair crews to attack the most severely affected areas. Weather and traffic conditions require the use of cold mix asphalt and the "throw and roll" method to temporary fill holes. These repair methods were very short term and permanent repairs are needed.

At the end of the day, there is only so much that can be done prevent the formation of potholes. Life in Chicago is defined by two seasons: winter and construction.



In response, the Chicago Department of Transportation (CDOT) is ramping up for an aggressive pavement season. A combination of private utilities and city agencies are gearing up to resurface a total of 333 miles of city streets. Resurfacing can only go so far in the battle against potholes. If the underlying pavement base is compromised, then full depth repairs and even reconstruction may be necessary. This would be followed by a comprehensive preventative maintenance program. At the end of the day, there is only so much that can be done prevent the formation of potholes. Life in Chicago is defined by two seasons: winter and construction. ASCE

Robert Brzezon is a Road and Highway Engineer with Parsons Corporation and is the Awards Director for ASCE YMG.

Sources:

Jon Hilkevitch "Chicago to ratchet up road resurfacing."

Chicago Tribune. March 13, 2014. Chicagotribune.com. May 28th 2014.

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Strategic Highway Research Program. FHWA-RD-99-168. Washington, DC: Federal Highway Administration.

Illinois Section ASCE Leads 2014 Report Card Effort

By Darren Olson and Pat Lach, Report Card Committee Chairs



Now the 2014 Report Card grades are in, and Illinois cumulative GPA for infrastructure rose slightly to a C-. The 2014 Report Card demonstrates that we can improve the current condition of Illinois infrastructure.

The 2014 Illinois Report Card on Infrastructure was released on April 2, 2014 in Springfield, IL. A panel of Professional Civil Engineers and American Society of Civil Engineers (ASCE) members throughout the state graded each infrastructure category according to the following eight criteria: capacity, condition, funding, future need, operation and maintenance, public safety, resilience, and innovation. In 2010, the Infrastructure Grade for Illinois was a D+, reflecting delayed maintenance and underinvestment across most categories.

Now the 2014 Report Card grades are in, and Illinois cumulative GPA for infrastructure rose slightly to a C-. The 2014 Report Card demonstrates that we can improve the current condition of Illinois infrastructure-when investments are made and projects move forward, the grades rise. For example, greater public and private investment for efficiency, connectivity and safety brought improvements in the rail category; renewed efforts in Chicago and across the state helped replace some of our oldest water systems; and, several categories benefited from short-term boosts in funding from the Illinois Job Now! initiative. However, in categories where we have under-invested

SUB COMMITTEE	MEMBERS
Aviation	Jennifer Gora Matt Huffman Colleen Quinn
Bridges	Dennis Morgan Andrew Keaschall Jessy Rojas
Dams	Nick Textor Bob Ivarson Bryan Martindale Darren Olson Dave Handwerk
Drinking Water	Chris King Bill Cussen
Navigable Waterways	Gary Loss Kay Whitlock Darren Olson
Rail	Bob Gorski Aaron Bowe Al Staron John Lazarra John G. Green, PhD, PE
Roads	Lou Arrigoni Brian Pawulla Nick Harrison Joe Catalano Andrew Walton
Transit	Steve Rienks Charlie Frangos Don Wittmer
Waste Water	Manju Sharma Adam Gronski

or our commitment remains uncertain, the grades have remained unacceptably low.

The release had a great response from the press with numerous interviews, articles and TV coverage. Please visit our website at <u>http://www.isasce.org/</u> for the full report card.

Thank you to the following authors for making this a success! **ASCE**

American Society Of Civil Engineers Illinois Section

98TH ANNUAL DINNER

- Meet the featured speaker and the evening's host, Mike Huff, former White Sox outfielder, and VP of the Bulls/Sox academy
- ASCE Illinois Section awards will be presented
- New Life Members will be introduced
- Sponsorship opportunities will be available including having your company's logo presented on the main U.S. Cellular Field scoreboard
- Optional, limited numbers of ballpark tours will be available including dugouts, the warning track and other areas
- For sponsorship information, please contact John G. Green at <u>john.g.green@urs.com</u>

October 30, 2014 U.S. Cellular Field Cocktail Hour: 5:30 pm Dinner and Awards: 6:30 pm

Register online at <u>www.isasce.org</u>

Illinois Section Founded 1916

Message from the Region 3 Director

By John Frauenhoffer, Region 3 Director

e will debate the Region Three Infrastructure Initiative at the Assembly on August 15 and 16 in Chicago. The Initiative concentrates on Transportation, Water, and Recreation and will provide Sections and Branches with proposals for new sustainable State and Local Infrastructure Funding. Assign your delegates soon and reserve the Assembly on their calendars. This will be the most important Assembly to date!

Highlights include presentations by:

- Stephen Beitler, Executive Director, Chicago Infrastructure Trust
- Steven Kepley, Civil Engineer and Mayor of Kentwood, Michigan
- Howard Rosen, University of Wisconsin
- Robert Stevens, ASCE President-Elect
- Nancy Berson, ASCE Geographic Services Department

The delegates will decide:

- The content and focus of the Infrastructure Initiative Proposals
- The degree to which ASCE Region 3 will champion new Sustainable Funding Scenarios
- Whether or not to petition the ASCE Board to adopt Region 3's lead

All ASCE members are welcome. Come join your Governors in Chicago!

For more information contact John Frauenhoffer 217 356 2797 mustang2797@att.net

President's Notes

(continued from page 2)

Elect/Student Scholarship Dinner was hosted by the Illinois Section's President-Elect **Mike MacKinnon** and featured a presentation by ASCE's President-Elect **Bob Stevens** on his life, career and vision for ASCE. The dinner culminated with the awards of undergraduate and graduate student scholarships on behalf of the Technical Groups and Institutes. The Annual Golf Outing to support the Minority Affairs Committee was held at Seven Bridges and although it was a bit cloudy and chilly, the event had one of the largest number of attendees in several years. The Section, Groups and Institutes have a wide variety of events and activities over the next few months and we invite you to keep track of the emails and calendar to make sure you are able to participate!

With summer herve (finally!), the classic joke of only having two seasons in Chicago: Winter and Construction rings especially true this year as we leave one difficult winter and transition into a rapidly escalating construction season. This is our annual reminder for you to please slow down in work zones!

If you have any questions, comments or concerns, please feel free to let me know. The Section Board serves all of you, our members, and we want to make sure that we are doing what we can to improve your life and career as a civil engineer. I can be reached at <u>president@isasce.org</u> and we always have room for one more volunteer. **ASCE**

The San Francisco-Oakland Bay Bridge

(continued from page 1)

Crossing. All of them total about five miles, of which four miles are over water. The West Span is comprised of two back-to-back suspension spans, one anchored at Yerba Buena Island, one in San Francisco, each is anchored to a massive center anchor pier. Each suspension bridge is about 4700 feet long. Main spans are 2,310 feet and side spans are 1,160 feet long. The overall structural system consist of two parallel wire cables, 26 inches in diameter, supported on X-braced steel towers, and carrying a truss stiffened deck roadway. The truss system is 66 feet wide and 35 feet deep, with wind bracing in the lower plane. Three types of steel were used: carbon steel, silicon steel, and nickel steel for most of structural components. Special heat treated eye-bars were used for East Bay Crossing trusses. The upper deck was designed for automobile traffic, while the lower deck was designed for three lanes of 30 ton trucks, and two lanes for 70-ton interurban electric rail cars.

The new white painted single tower self anchored suspension span has been designed to survive the "Big One," an earthquake that is expected to occur once every 1500 years.

Large cellular reinforced concrete caissons were among the largest in the world at the time of their construction. Caissons are build of 15' diameter cylinders. The center pier for example has 55 cylinders, placed in 5 rows of

West Bay—Two suspension bridges back to back

11 cylinders. This will be in plan about 90' by 175'. The towers are of different heights to accommodate the vertical curve of the roadway. The main tower shafts are a multi-cellular cross section built of riveted steel plates and bulheads. The 540 foot long Yerba Buena Island tunnel was the largest diameter tunnel in the world at the time it was built. It consists of a 79 foot wide arch with a rise of 21 feet that is supported by two 35 foot high retaining walls. The tunnel is located under the Yerba Buena island, between the west bay and east bay crossing. The inside of tunnel and arch are finished with tile.

Following the 1989 Loma Prieta earthquake, California DOT decided to rebuild the East Bay Crossing. Bay Bridge is located between the active Hayward and San Andreas faults which can generate earthquakes of magnitude 7.5 to 8.0. The new white painted single tower self anchored suspension span has been designed to survive the "Big One", an earthquake that is expected to occur once every 1500 years. It has been designed in such a way to be immediately available for use by emergency vehicles right after a large seismic event. The single steel tower consists of four pentagonalshaped shafts that are interlinked with shear links. The shear links will absorb energy during a seismic event and prevent damage to the tower. The shear links can be relatively easily replaced.

The bridge superstructure is comprised of a Vierendeel frame with dual steel box girders, which are interconnected by steel crossbeams to resist both horizontal and vertical loads. Between segments there are 60 foot long hinge pipe beams. The pipe beams are 4-6 foot diameter steel tubes that extend longitudinally from one deck segment into the adjoining segment. The floating deck has no lateral or horizontal connection to the tower, which minimizes torsional moments and shears into the tower. The bridge is also equipped with a monitoring system to indicate forces (continued on page 9)

The San Francisco-Oakland Bay Bridge

(continued from page 8)

and displacement during an earthquake event. Another feature is a bike and pedestrian path on the south side of the bridge that will be extended in the near future across the West Bay into San Francisco.

The original bridge was built in three years. The construction of the new eastern span lasted eleven years with a price tag of \$6.4 billion. The entire 1936 crossing cost \$30,000 a foot in adjusted 2013 dollars, while the shorter new span cost came at \$550,000 per foot. This was the most expensive project in the history of California.

This is the best illustration of how much construction projects have changed since

the time of the Great Depression. Today workers safety and environmental laws have enormous influence on the design pace and cost of what is built. Twentyfour men died building the original bridge, none has perished on the new span. The new span has taken four years and \$155 million for preparation of an environmental impact study. An average iron worker on the original bridge was earning \$11 per day, now the California rate for the same craftsman is \$471 per day.

Bay Bridge is the workhorse of the San Francisco Bay Area bridges, it carries 286,000 vehicles daily, almost twice as many as the Golden Gate Bridge. **ASCE** The entire 1936 crossing cost \$30,000 a foot in adjusted 2013 dollars, while the shorter new span cost came at \$550,000 per foot. This was the most expensive project in the history of California.

New Single Tower Self-Anchored Suspension Span

Illinois Section News & Secretary Report

MAY 2014

n an effort to inform Illinois Section members of the discussions at the monthly Board meetings, the Section Secretary contributes this monthly article to the newsletter. Any questions or comments on the Board activities are welcome by contacting Thera Baldauf, at thera.a.baldauf@mwhglobal.com

■ Treasurer's Report

▲A treasurer's report was presented at the March, April and May Meetings. All reports were approved with no changes.

Group Reports

▲Groups presented a written report outlining previous and current month's activities.

▲ Website – The new website is up and running. Please check it out!

▲ Report Card – The Illinois Section released the Report Card for Illinois Infrastructure on April 2, 2014 in Springfield, Illinois. ASCE National and the Transportation for Illinois Coalition (TFIC) helped the Illinois Section with coordination efforts. The Illinois Section has had several media outlets interview members and provide commentary and reporting on the Report Card

▲ Annual DC Fly-In – The Annual DC Fly-In was held March 18-20, 2014. President Lach and Secretary Baldauf attended on behalf of the Section and met with their respective Senator and Representative's offices.

▲ Spring Dinner – The date for the Spring Dinner was on April 17, 2014 at Maggiano's Little Italy. National President-Elect Robert Stevens presented and the Technical Groups and Institutes presented scholarships.

▲ **Golf Outing** – The Section held the outing on Thursday, May 22, 2014 and had a successful event.

▲ ACEC Professional Design Alliance – The Illinois Section continues to offer support and assistance. ACEC is also providing the Section with updates on pertinent legislation topics.

The Illinois Section Board Meetings are held every first Monday of every month with the exception to holidays. The next board meeting is scheduled for August 4, 2014 at 5:30pm at MWH Americas, Inc., 175 West Jackson Blvd, 19th Floor. Meetings in the third quarter of 2014 will be held on August 4, September 8 and October 6.

By Thera A. Baldauf thera.a.baldauf@mwhglobal.com

Section Activities

YMG

Social Event: Trivia Night!	
Date:	June 2, 2014
Time:	5:30 pm-8:30 pm
Place:	Sidebar Grille 221 North LaSalle Street Chicago, IL
RSVP:	Madelaine Johnson at <u>mmjohnson@quandel.com</u>

ASCE IL Section EWRI

Monthly Committee Meeting

Date:	Tuesday, June 10th, 2014
Time:	5:30pm
Host:	Baxter & Woodman
Place:	8430 West Bryn Mawr Avenue Suite 400 Chicago, IL 60563
RSVP :	eewr.ilasce@gmail.com

4th Annual Sustainability Workshop

Date:	Friday, June 13, 2014	
Time:	8:30 am-12:00 pm (check-in 8:00 am, breakfast will be provided)	
Place:	Riverway (auditorium) 6133 North River Road Rosemont, IL	
PDHs:	3 PDHs	
Cost:	\$45.00 ASCE / ACEC / APWA members	
	\$50.00 Non-members	
	\$40.00 Students & Government	
Registration:		
	https://www.123signup.com/regi	

ister?id=drgqz

ASCE T&DI/ ACEC / APWA / **ISPE / ITE**

Luncheon Event

Rebekah Scheinfeld, Commissioner at Chicago Department of Transportation (CDOT)

- Date: Thursday, June 19, 2014
- Time: 11:30 am-1:30 pm
- Place: Union League Club (Chicago) 65 W Jackson Blvd. Chicago, IL 60604
- One (1) Hour PDHs:

\$45.00 ASCE / ACEC / APWA / Cost: ISPE / ITE members \$55.00 Non-members

\$30.00 Students & Government

Sponsorships:

\$100.00 Silver Sponsor (includes 1 registrant) \$500.00 Gold Sponsor (includes 10 registrants)

Lunch will be provided.

RSVP: Seating is limited, so register early! https://www.123signup.com/register?id=drstp

If you have questions regarding the event, please contact Andy Walton at 312.242.6430 or <u>awalton@primeraeng.com</u>.

Annual Dinner

(Save th	e Date)
Date:	Thursday, October 30, 2014
DI	

Place: U.S. Cellular Field, the home of the Chicago White Sox

For all Section, Group and Committee events, check out the Section website at:

www.isasce.org/web/ section/calendar.html