WELCOME
Welcome to the 2016 International Bridge Conference® (IBC), sponsored by the Engineers’ Society of Western Pennsylvania (ESWP) — our 33rd annual conference! 2016 marks the first time the IBC is being held outside of the City of Bridges, Pittsburgh, PA. It is the same great IBC, but now located in National Harbor, MD, just outside of our nation’s capital. The new location, ideally suited for the ever-growing IBC, is the Gaylord National Resort & Convention Center. The “Gaylord” will host all events of the IBC, and is located within walking distance of the Woodrow Wilson Bridge along the Potomac River. We are pleased to have Virginia Department of Transportation, (VDOT) as our Featured Agency to showcase their bridge program. Remember, the IBC is now a four-day event with many of our workshops scheduled both before and after the conference to enable attendees to take advantage of more conference offerings.

CONTINUING EDUCATION CREDITS
Attendees earn valuable continuing education credits for P.E., S.E., or P.G. licensure by attending the IBC! The ESWP, sponsor of the IBC, is an approved provider by both the New York and Florida Board of Licensure, satisfying licensure requirements there, as well as in many other states. All technical sessions and workshops, qualify for professional development hours (PDH), awarded upon request following the conference.

ARRIVING
Getting to/from Gaylord National Resort & Convention Center and downtown Washington, D.C. is very easy. There are three major airports in the area:
• DCA: only 8 miles/15 minutes, we have a dedicated Gaylord shuttle that runs for $18 one way (taxi is about $25)
• IAD: 35 miles/45 minutes, taxi is about $50
• BWI: 37 miles/50 minutes, taxi is about $60
For those who prefer travel-by-train, there is also DC’s Union Station, which is only 8 miles from the hotel.
The Gaylord also provides a daily shuttle from 8:00 A.M. – 8:00 P.M. which goes to two stops downtown and is $13 one-way or $20 round trip (location stops are Union Station and Ronald Reagan Building/2 blocks from the White House); it is a great way to get downtown and see the sights, or a way to get from Union Station to the Gaylord National Resort.

LODGING
The IBC has a special block of sleeping rooms reserved at the Gaylord National Resort & Convention Center, host hotel for all IBC events & activities. Rates for a standard room are $249.00 per night, plus applicable taxes & fees. Reservations should be made through the IBC homepage, found here: https://eswp.com/bridge/lodging/
Set your sights on luxurious comfort at Gaylord National Resort & Convention Center when visiting the Washington D.C. area. The spectacular waterfront resort, with a stunning 19-story glass atrium and sweeping views of the Potomac River, is steps from National Harbor’s premier entertainment and shopping district and only eight miles south of the nation’s capital. After exploring the city and surrounding areas, return to a first-class resort featuring a rejuvenating spa, indoor pool and whirlpool, state-of-the-art fitness center and a number of unique restaurants and shops. With more than 500,000 square feet of flexible event space, the Gaylord offers the chance to experience unforgettable business meetings, conferences or social gatherings. Come discover why Gaylord National offers an unmatched experience in the Capital Region. Learn more at http://www.marriott.com/hotels/travel/wasgn-gaylord-national-resort-and-convention-center/.
Address: 201 Waterfront Street National Harbor, MD, 20745 USA

LOCAL ATTRACTIONS
National Harbor is home to more than 150 diverse shops and boutiques and over 30 dining locations. Whether you’re in for the day or staying at one of our awesome, convenient hotels, National Harbor’s vibrant downtown atmosphere will delight you. Learn more about the attractions at http://www.nationalharbor.com/

SPECIAL NEEDS
The International Bridge Conference® and ESWP support the Americans with Disabilities Act (ADA), which prohibits discrimination against, and promotes public accessibility for those with disabilities. We ask those requiring specific equipment or services as an attendee to contact the ESWP Conference Department at 412-261-0710, extension 11 and advise us of any such requirements in advance.

QUESTIONS?
Loads of additional information is available on our website at eswp.com/bridge or you can scan the QR code below. Still have questions? Please contact IBC Manager Cori Weber, c/o Engineers’ Society of Western Pennsylvania; she can be reached by e-mail: c.weber@eswp.com or by telephone at 412-261-0710, extension 11.

REGISTER ON-LINE AT WWW.ESWP.COM/BIDGE
Full Registration at the IBC includes admission to the Keynote Session, Featured Agency Session, all Technical Sessions, Workshops, and Exhibit Hall (including daily Exhibit Hall buffet luncheons & receptions). One- or Two-Day Registration includes all sessions and Exhibit Hall functions corresponding to the day(s) selected.
As always, the heart of the IBC is the quality technical presentations described in detail in this guide under “Technical Sessions”. We also offer a number of “Workshops” presented by many of our co-sponsors, and other industry-leading groups on an even wider variety of bridge topics.
You can register on-line at https://eswp.com/bridge/registration/ Your registration, along with payment, must be received by the Engineers’ Society of Western Pennsylvania by Friday, May 27, 2016. Following that date you must register on-site at the conference.
All refund requests must be received in writing. No refunds after May 20, 2016. You will be responsible for the appropriate registration fee if cancellation is not received by May 20, 2016.

EXHIBITS & SPONSORS
The IBC Exhibit Hall is filled with experts in the bridge industry and represents engineering consultants, designers, constructors, special interest groups, service providers and many others. More than 150 booths will offer attendees many more opportunities to extend their learning experience beyond the technical presentations made during the conference. Also, networking in the Exhibit Hall is enhanced by the luncheons and receptions presented there and open to all registered attendees.

TURNER-FAIRBANK HIGHWAY RESEARCH CENTER TOUR
Tuesday, June 7, 1:00–4:00pm (bus departs at noon, limited seating, additional registration fee and approved identification required).
The Turner-Fairbank Highway Research Center (TFHRC) is the Nation’s premier federally owned and operated highway research and development facility. Located in McLean, VA as the research center for the Federal Highway Administration (FHWA), TFHRC coordinates and conducts an ambitious program of innovative highway research and development to address critical needs of the national highway system. Through its three research and development (R&D) offices — Infrastructure, Safety, and Operations — along with the Exploratory Advanced Research Program, FHWA engineers, scientists, and psychologists conduct applied and exploratory advanced research in vehicle-highway interaction, nanotechnology, and a host of other types of transportation research in safety, pavements, highway structures and bridges, human-centered systems, operations and intelligent transportation systems, and materials. With more than 20 laboratories, the center provides a vital resource for advancing the body of knowledge that has been created and developed by our researchers.

GENERAL INFORMATION
CABLE-STAYED BRIDGES

Wednesday, June 8; 8:00–10:00am

IBC 16-01: Innovative Structural System for Cable-Stayed Bridge
Thomas Spath, P.E., and Seth Connell, P.E., Parsons, New York, NY
The Port Authority of New York and New Jersey is replacing the 1928 Goethals Bridge through a Public Private Partnership. The replacement crossing includes a modern cable-stayed bridge spanning the Arthur Kill between Elizabeth, NJ and Staten Island, NY. Overall, the bridge will consist of a 7,306 ft. long elevated structure including the 1,635 ft. overall length cable stayed bridge. Consistent with expected growth in the region, the design includes built-in future transit expansion capabilities.

IBC 16-02: Challenges/Innovation to the Cable Stays for Hybrid Structures
Erik Mellier, Freyssinet, Rueil Malmaison, France; Andrew Micklus, Jr., Freyssinet, Inc., Sterling, VA
With its innovative design, of 1,408 m long central span and 58 m wide deck carrying 2 x 4 traffic lanes and two railway tracks in its center, the Third Bosphorus Bridge located in Istanbul, Turkey, is considered the widest hybrid suspension/stay cable bridge in the world. The presentation will emphasize the main issues and innovations that were needed for the stay cables to support the construction of this first of a kind bridge.

IBC 16-03: Numerical Model for Predicting Carbon Fiber Composite Cable Forces in a Cable-Stayed Bridge
Kathryn A. McDonald, B.S. (Hons), City of Gold Coast, Gold Coast, Queensland, Australia; Andrew J. Goupee, Ph.D., Keith A. Berube, Ph.D., and Roberto Lopez-Anido, Ph.D., P.E., University of Maine, Orono, ME
Carbon Fiber Composite Cables (CFCC) have high tensile strength, low weight and excellent corrosion resistance. As such they provide a viable replacement to traditional steel cables in many cable-stayed bridges, which may increase a structure’s lifespan and reduce maintenance requirements. The Penobscot Narrows Cable-Stayed Bridge offers a unique opportunity to develop these technologies. This paper analyzes continuous CFCC structural health monitoring data, and investigates the relationship between the external ambient air temperature and CFCC forces.

IBC 16-04: Design Scheme into the Rail-cum-Road Cable-stayed Bridges with Span Length over 1000m
Zongyu Gao, China Railway Major Bridge Reconnaissance & Design Institute Co., Ltd., China; Dr. Houxin Wang, CITIC Metal Co., Ltd., Chaoyang District, Beijing, China
The Hutong Yangtze River Bridge is a self-anchored cable-stayed bridge, with the longest span of 1092m in China. In order to meet the functions of such large structures, high performance steels with high strength, good low temperature toughness (≥120J@-40oC), excellent weldability as well as high fracture toughness, are utilized including Q500q, Q420q, and Q370q, etc., which are usually microalloyed by Nb to realize such high comprehensive properties.

INSPECTION/EVALUATION

Wednesday, June 8; 8:00–10:00am

IBC 16-05: Applications of Modern Imaging Technologies in Bridge Asset Management
Y. Edward Zhou, AECOM, Germantown, MD; Mark Guzda, AECOM, Hunt Valley, MD; Christopher Higgins, Oregon State University, Corvallis, OR
With the availability of high definition digital cameras and advanced digital image processing techniques, a procedure has been developed that documents and monitors concrete surface cracks in an efficient, complete, objective, and accurate manner. This paper discusses such procedure, as well as its applications for collection and processing of digital images of superstructure and substructure elements of concrete bridges. Based on these digital images, monitoring for condition changes over time can become a standardized and efficient process as part of the bridge management system for asset management purposes.

IBC 16-06: SHRP2 Advancement in Nondestructive Testing for Concrete Bridge Decks
Yajai Tinkey, Olson Engineering, Wheat Ridge, CO; Matthew DeMarco, FHWA Resource Center, Lakewood, CO; Larry Olson, Olson Engineering, Haymarket, VA
Federal transportation funding under the current MAP-21 authorization requires state DOTs to assess the condition of bridge decks and plan for life-cycle maintenance expenditures per accepted asset management practices. To assist bridge owners, the SHRP2 program sponsored research into emerging non-destructive (NDT) scanning technologies to quickly assess the condition of concrete bridge decks – rapidly identifying bridge deterioration mechanisms and evaluating the effectiveness of deck preservation techniques. Under the SHRP2 Implementation Assistance Program, eight state DOTs were awarded funding to supplement traditional method with the latest NDT technologies for improved condition assessment. This paper overviews each of the NDT technologies evaluated; highlights the broad array of deployment efforts underway across the IAP states; and emphasizes how NDT scanning data are to be effectively used within DOT inspection, maintenance and asset management programs.

IBC 16-07: Comprehensive Testing and Evaluation of the James River Bridge in Virginia – How to Chain Drag and Test a Four and a Half Mile Bridge in One Night
Deanna Neving and Philip Quillin, Michael Baker International, Virginia Beach, VA; Christopher Eggleston, VDOT - Hampton Roads District, Suffolk, VA; Vihad Ganji, Michael Baker International, Hamilton, NJ
The 4.4 mile long James River Bridge in southeastern Virginia underwent a thorough field evaluation to develop repair recommendations and estimate maintenance costs. Ground Penetrating Radar and Laser Crack Measurement Scans were performed on the entire bridge to locate deficient deck areas. Rebar cover measurement, sounding, half-cell potential, chloride profile sampling, and petrographic analysis tests were conducted on a small sample of decks for comparison. Similar tests were conducted in a small sample of beams.

IBC 16-08: A Cost Effective and User-friendly Rating Tool for Complex Bridges
Pamela Yuen, Shaojun Sun, and YiDong Eddie He, Parsons Corporation, Chicago, IL; Yihong Gao, MnDOT - Bridge Rating, Oakdale, MN
NBIS requires all highway bridges on public roads must be rated in the US; however, no tool is readily available to conduct a reliable rating on overweight permit evaluation for complex bridges without conducting complicated structural analysis, which is time consuming and cost prohibitive. To address such practical needs, a rating tool was developed allowing users to conduct ratings for combinations of typical AASHTO standard vehicles and any user-defined vehicles. This paper will present this cost-effective and user-friendly rating tool along with MnDOT and local agencies’ processes and practice in using this tool in their various complex bridges, such as arch, segmental, and truss bridges.

REHABILITATION 1

Wednesday, June 8; 8:00–10:00am

IBC 16-09: Maryland’s Bay Bridge - The First Main Cable Dehumidification Project in North America
Shane Beabes, AECOM, Baltimore, MD; Philip Waldvogel, Amman & Whitney, New York, NY; Mark Bulmer, AECOM, Leeds, UK
Since the Akashi-Kaikyo Bridge was built in 1998, eight new bridges and fifteen existing suspension bridges are known to have been dehumidified across Asia and Europe. In 2013, main cable dehumidification work began on the William Preston Lane, Jr. Memorial (Bay) Bridge in Maryland, USA – the first cable dehumidification project in North America. The presentation will provide an overview of the project including construction, system commissioning, and initial results obtain from the data acquisition system.

Gaylord National Resort and Convention Center, National Harbor, MD USA
IBC 16-10: Retrofit and Reconstruction of the Century Old Historic Georgia Street Arch Bridge
Nathan Johnson and Ebrahim Amiri-Hormozaki, Kleinfelder, San Diego, CA
Constructed 100 years ago as “The Gateway to eastern San Diego”, the Georgia Street Bridge is a three-hinge arch with a 700 foot long grade separation. The structures are badly deteriorated with poor seismic detailing. The entire superstructure and spandrels will be replaced and arch-ribs will be retrofitted using hydro-demolition and self-consolidating fiber reinforced concrete mix. Walls will be stabilized using ground anchors and new facing. The bridge rehabilitation/reconstruction will preserve the historic resource for future generations.

IBC 16-11: Route 37 EB Mathis Bridge Rehabilitation
Rama Krishnagir and Steven Esposito, Parsons Brinckerhoff, Lawrenceville, NJ; Maria Yap, Milos Kivich, and Mark Soryal, Hardesty & Hanover, LLP; West Trenton, NJ; George Kuhn and John Longworth, New Jersey DOT, Trenton, NJ
NJ 37, an evacuation route, links the mainland to beach communities in Seaside Heights, NJ. Three Eastbound lanes are carried by the 4,860-foot long, 66-span, 60-year-old, double leaf bascule bridge. The deteriorated deck, bearings and substandard or obsolete mechanical/electrical components needed replacement. The $60-million rehabilitation preserves the existing structure, replaces the deck and bearings, improves traffic lanes and safety features, and includes customized resistance barrier gates, warning gates, substructure repairs and a major Electrical/Mechanical overhaul.

IBC 16-12: Interstate Delta Frames: Structural Steel Retrofit, & Restoration to Essentially Infinite Fatigue Life
Loai El-Gazzairly, Whitman, Requardt and Associates, LLP, Richmond, VA; Rex Pearson and Park Thompson, VDOT Staunton District Bridge, Staunton, VA; Jose Gomez, VDOT VTRC, Charlottesville, VA
For the last 20 years the delta frames of the I-64 bridges over Maury River experienced fatigue cracking causing noticeable structural deterioration and continuous deficiency in the bridge inventory rating. Analytical investigation showed that the bridge could achieve infinite fatigue life by introducing two directional composite behavior with the deck. The deck is replaced using lightweight concrete and a sophisticated computer model was developed to monitor its construction sequence. An experimental program was also implemented.

CONSTRUCTION/FABRICATION

Wednesday, June 8; 8:00–10:00am

IBC 16-13: Almonte Viaduct Construction Process
David Arribas, Pedro Cavero, and Pablo Bernal, Fcc Construccion, Madrid, Spain; Pablo Jimenez, Adif Alta Velocidad, Caceres, Spain
The Almonte Viaduct is located in the south west of Spain into the high speed railway line Madrid–Extremadura. It is 996m (3,268 feet) long with a concrete arch in the main span of 384m (1260 feet) long. It is the world’s largest high speed rail arch and the world’s third-largest concrete arch taking into account also road bridges. The construction of the bridge has been a challenging process.

IBC 16-14: Construction of John Greenleaf Whittier Memorial Replacement Bridge
David Rogowski and Lisa Briggs, Genesis Structures, Kansas City, MO; Chris Doigle, Walsh Construction, Canton, MA
With daily tide cycles of 9 ft and with areas inaccessible by cranes, an erection method utilizing two launched girders supporting overhead gantry cranes was implemented. This unique method was used to erect the approach spans, the arch floor system and a 200 ton crane which traversed the arch floor system to erect the upper arch. The launch girders were moved and will be reused to remove the existing bridge and erect the SB bridge.

IBC 16-15: Field Erection of Large Girder Assemblies for Tappan Zee Bridge
Tom Zieman, Zieman Engineering, LLC, Stamford, CT; Bill Batzel, Tappan Zee Constructors, LLC, Tarrytown, NY
The new Tappan Zee bridge consists of over two miles of plate girder approaches, which are being built in preassemblies up to 420 feet long and weighing up to 2200 kips. These preassemblies are set using a 1700 tonne capacity floating shear leg crane. This presentation will describe the process of erection, the hydraulically adjustable lifting frame used to set the girders, stability and deflections of the girders, and connection of crossframes between the assemblies.

IBC 16-16: The Influence of Cold Cambering on the Toughness of Rolled I-beams
Michael Bresch, II and Ronnie Medlock, High Steel Structures, LLC, Lancaster, PA; Dr. Y. Frank Chen, Penn State University, Middletown, PA
The practice of cambering steel I-shaped beams by a cold bending process is becoming increasingly popular. However, the impact of cold bending on the toughness and ductility of the steel has raised concern among some engineers. This research investigates these concerns by performing cold cambering tests. Specimens are taken from areas with the highest deformation and areas with no deformation. Charpy V-notch tests and tensile tests are performed and the results are presented and discussed.

PROPRIETARY

Wednesday, June 8; 2:00–4:30pm

IBC 16-17: Jacking of Bridges/Underpasses, Under Active Railroad Tracks
Riccardo Castracani, Petrucco USA LLC, Miami Beach, FL
The need for safer Railroad Crossings is becoming very apparent during the recent years, due to increased train and vehicular traffic, making existing at grade crossings obsolete. The problem associated with going from an at grade crossing to an underpass, or an overhead bridge, is the oftentimes impossibility to stop the train traffic, or the cost involved in doing so. Petrucco has patented a very safe system that can temporarily support the railroad tracks, while a pre-cast underpass, or bridge, is jacked under this support system, therefore never needing to detour trains, interrupt the service, or stop them at all. The solution results in a safe, economical methodology to replace at grade crossings with underpasses, while eliminating the need to detour or stop trains. This methodology has been used very successfully all over Europe, and we have recently introduced the system in North America.

IBC 16-18: Recent Applications of Seismic Isolation and Energy Dissipation Solutions in Latin America
Carlos Mendez Galindo, mageba Mexico, Benito Juarez, Mexico City, Mexico; Gianni Maor, mageba USA, New York, NY; Borja Bailles, mageba International, New York, NY
The design of critical structures to withstand earthquakes continues to gain importance in Latin America. This paper presents some recent applications of such seismic protection in Mexico, Venezuela, Ecuador and Peru. All these countries are located in areas with strong earthquakes. The case studies presented are evidence of the increasing interest of designers, contractors and owners in ensuring safer, efficient structures, which above all ensure the safety of the population and mitigate structural damage.

IBC 16-19: Repair of Bridge Piles in a Crocodile-Infested River
Stephen Day, Stephen Day and Associates P/L, Cairns, Queensland, Australia; Mo Ehsani, Quakewrap, Inc, Tucson, AR; Tony White, Quakewrap Australia, Yeeronga, Queensland, Australia
Octagonal PSC piles in a bridge over the crocodile-infested Barron River in Cairns in north Queensland, Australia, experienced severe ASR cracking and required remediation to protect against corrosion damage. Forty piles were repaired underwater by encasing in a protective jacket consisting of thin glass FRP laminate sheets wrapped around the piles to create a seamless, impervious, cylindrical shell and subsequently filled with a low viscosity resin that sealed the concrete and filled any voids and cracks.
TECHNICAL SESSIONS

IBC 16-20: Accelerated Bridge Construction: 3 Methods
Different factors of productivity in industrialized concrete deck construction are discussed, considering 3 different construction methods used in 3 projects with 3 different contexts. An introduction of an Organic Prestressing System is presented – a centrally controlled prestressing system that increases structural efficiency and safety, confirming a positive impact in productivity.

IBC 16-21: Folded Steel Plate Girder System – Applications in Accelerated Bridge Construction
Matthew Macey, CDR Bridge Systems, LLC, Pittsburgh, PA
The Folded Steel Plate Girder (FSPG) System is the culmination of over ten (10) years of research, development, and testing resulting in a short span steel alternative to concrete bridges. In this paper, the FSPG System’s use as an accelerated bridge construction technique will be presented. The presentation will include the FSPG System design features, fabrication, and construction.

LONG SPAN

IBC 16-22: The New Hulton Bridge – Elegance and Efficiency
Christopher Vollmer, Eric Veydt, and Thomas Leech, Gannett Fleming, Inc., Pittsburgh, PA; Lou Ruzzi, Pennsylvania DOT, Bridgeville, PA
The new Hulton Bridge represents a close collaboration between the owner and community resulting in an elegant and efficient structure. The structure lines and pier detailing are unique resulting in a bridge which will become both a gathering point and an icon to the community. The structure was designed with hybrid girders for optimal efficiency. The 500’ main span was erected using strand jacking, the first application for a plate girder bridge in Pennsylvania.

IBC 16-23: I-64 Daniel Boone Bridge over the Missouri River
Michael Carroll and Kevin Eisenbeis, Burns & McDonnell Engineering Company, Kansas City, MO
The new 2,615’ Daniel Boone Bridge was constructed using an innovative design-build delivery solution. The design included the longest parallel flange, steel plate girder span on the Missouri River at 510’. Foundations include drilled shafts up to 11’ in diameter, designed to resist large seismic and vessel collision loads. Unique ground treatment was utilized to mitigate soil liquefaction concerns. The Spirit of Saint Louis overpass was raised 24” to correct a low vertical clearance problem.

IBC 16-24: Design and Construction of the Queensferry Crossing
Carson Carney, American Bridge Company, Corapolis, PA
Once constructed, the Queensferry Crossing will be the longest spanning composite deck and multi towered cable stayed bridge in the world. Its unique crossing stays form and record length will assure it a place among the globe’s elite structures. The Queensferry Crossing paper will provide an in depth review of the design and build process for a world class structure that has been delivered within the client’s budget, their time schedule and the stakeholder’s expectations.

IBC 16-25: Construction of the Ohio River Bridges East End Crossing Cable-stayed Bridge
Marcos Laizias, Jacobs, Morristown, NJ
Procured under a P3 contract and currently under construction with estimated completion in 2016, the main river spans of the Ohio River Bridges East End Crossing feature a 2,280-ft long three-span steel composite cable-stayed bridge with a center span of 1,250 feet and convex curve diamond towers. To fast-track construction, the cable-stayed bridge is being constructed using a combination of several construction methods. The Indiana side span is incrementally launched while the Kentucky side span is stick-build on falsework, allowing for simultaneous construction of the superstructure steel grillage of the two side spans while the diamond towers are constructed. Upon completion of the towers, the center span is constructed by balanced cantilever. The paper will discuss the methods of construction for the superstructure and superstructure of the cable-stayed bridge.

IBC 16-26: Design of John Greenleaf Whittier Memorial Replacement Bridge
Gregor Wallmann, HNTB, Blacksburg, VA; Savas Kiriaikidis, MassDOT, Boston, MA
The John Greenleaf Whittier Memorial Bridge carries Interstate I-95 across the Merrimack River between Newburyport and Amesbury, Massachusetts. Constructed in 1951, it has reached the end of its useful life. Replacement of the Whittier Bridge is the signature project of MassDOT’s three-billion dollar Accelerated Bridge Construction program. This paper explains the exceptional resiliency of the network tied arch structural system selected for the main span and presents some of the details developed to arrive at an efficient and durable structure.

IBC 16-27: Chesapeake Bay Bridge Dehumidification Design
Marwan Nader, George Baker, James Duxbury, and Carol Choi, T.Y. Lin International, San Francisco, CA
The Chesapeake Bay (William Preston Lane) Bridge in Maryland, USA, is the first cable dehumidification project in North America, one that will prevent future corrosion and extend the service life of the bridges. This paper presents a theory for maintaining air flow for timely cable dry-out and guidelines for effective sealing, optimal placement of injection and exhaust points, calibrated instrumentation, and effective mechanical, monitoring and control systems.

DESIGN 1

Thursday, June 9; 8:00–11:30am

IBC 16-28: Steel Girder Cross-Frames - Design, Fabrication & Erection
Shane Beabes and Patrick Holinda, AECOM, Baltimore, MD; Ronald Medlock, High Steel Structures, Lancaster, PA
Fabricated steel girder bridges constitute a significant part of the U.S. bridge inventory, and on a typical bridge it is not uncommon for the fabricated costs of the cross-frames to exceed that of the girders. Therefore, there are strong merits to evaluating the design, fabrication and erection of cross-frames to promote satisfactory performance and an economical design. The presentation couples a designer and fabricator’s discussion on contemporary issues while using a recent project as a backdrop.

IBC 16-29: History Matters: Compatible Bridge Design in Historic Districts
Michael Cuddy, PE., TranSystems, Philadelphia, PA; Peter Berg, PA DOT Engineering District 6-0, King of Prussia, PA
Bridges are not mere conduits for transportation, but play important roles in shaping the identity of a place. What happens when a bridge located in a historic district need to be replaced? How do you design a new bridge compatible with the setting? This paper will explore the issues and offer insight into appropriate designs. Highlights include understanding history; decoration versus preservation; overshadowing history with applied decoration; and effective design principles.

IBC 16-30: Conceptual Design of Earthquake Resisting Bridge Structures: a Practical Approach
Alejandro Perez Caldentey, FHECOR North America, Falls Church, VA; Hugo Corres Pieretti, Dr., José Rama Martín, and Javier Torrico Liz, FHECOR Consulting Engineers, Madrid, Spain
Bridge design must always begin with a good conceptual design which analyzes and compares different possible solutions which fit a given set of constraints. One major constraint can be the location of the structure in a highly seismic area. In such cases, different strategies can be adopted for design, from ductile behavior to damping and seismic isolation. This paper presents a practical approach to decide the best strategy depending on the characteristics of the structure.

IBC 16-31: Design of a Modern Concrete Arch Bridge at the University of California, San Diego
Anthony Sanchez, Ph.D., PE., and Gernot Komar, Maffett & Nichol, San Diego, CA; Garrett Dekker, P.E., Maffett & Nichol, Walnut Creek, CA; Christina Mannon, RA, LEED AP, University of California, San Diego, La Jolla, CA
Bridges on California freeways have become so standardized that it’s difficult to tell one from the next. This project will break that paradigm and provide a visually interesting bridge across the busy I-5 corridor.
An elegant and modern concrete arch will clear-span the freeway and unite the UCSD campus. Caltrans-style cast-in-place construction methods will keep the cost reasonable. The structure will provide a visual cue to motorists, and become a landmark for the University.

IBC 16-32: Seismic Design of Steel Girder Bridges over Two Western Kentucky Lakes
Brad Robson, Ph.D., P.E. and David Rust, P.E., Palmer Engineering Company, Winchester, KY; Kyle McLeMere, P.E., Palmer Engineering Company, Nashville, TN
The Kentucky Transportation Cabinet is constructing new bridges over Kentucky Lake and Lake Barkley in the heart of the New Madrid Seismic Zone. More than a mile of steel girder approach spans were designed to remain functional after a large earthquake. Extensive field testing along with site-specific hazard and soil response analyses provided comprehensive input for structural design. Nonlinear time history analyses allowed accurate representation of soil-structure interaction and seismic damper performance.

IBC 16-33: Updating the AASHTO LRFD Wind Load Provisions
Wagdy Wassaf, AECOM, Mechanicsburg, PA; Jon Raggett West Wind Laboratory, Monterey, CA
Traditionally, wind load provisions in AASHTO Bridge Design Specifications were based on the fastest-mile measure of wind speed. Modern wind codes are all based on constant averaging time. AASH-TO adopted new wind load provisions using the 3-second gusts and new wind maps to be in line with the current practices of the National Weather Service and the ASCE 7 and to provide uniform reliability. This paper introduces the research and the new provisions.

SPECIAL PURPOSE BRIDGES
Thursday, June 9; 8:00–11:30am

IBC 16-34: The First Arch Supported Stress Ribbon Bridge in the U.S.
John Dewar, P.E., Freese and Nichols, Inc., Fort Worth, TX; Miguel Rosales, Rosales + Partners, Boston, MA; Michael Stein schlach bergermann partner, New York, NY
Completed in 2012, the Phyllis J. Tilley Memorial Pedestrian Bridge is the first arch-supported stress ribbon bridge in the United States. This bridge has a central steel arch supporting a stressed ribbon at mid-span, thus reducing the ribbon sag and counteracting the high ribbon anchorage forces with offsetting arch thrust reactions. This results in an extremely slender, elegant profile, with spans of up to 160 feet with only a 10 inch deck depth.

IBC 16-35: Capital Cascades Connector Bridge
Lyle Carter, FIGG Bridge Engineers, Inc., Tallahassee, FL; Gary Phillips, Blueprint 2000 Intergovernmental Agency, Tallahassee, FL
The new Capital Cascades Connector Bridge is part of the Capital Cascades Trail located just south of the Capital Building in Tallahassee, FL. This 163’-2” long signature pedestrian bridge consists of a 13’-10” wide precast post-tensioned concrete span over the heavily traveled Monroe Street. Features include solar canopies capturing the sun’s energy to provide light displays at night and provide shade for pedestrians. The presentation will highlight the bridge and trail construction recently completed.

IBC 16-36: Parkside Pedestrian Bridge Design Challenges
Steven Paulovich and Christopher Conray, CH2M, Herndon, VA; Ravindra Ganvir, DDOT, Washington, DC
DDOT’s Parkside Pedestrian Project features challenges and complexities which drove the design towards prefabrication and construction techniques that will decrease interfaces and impacts with railroad and utility facilities. Innovative inter-agency agreements were also developed to facilitate the work. The signature bridge spans have a length of approximately 400 feet. It crosses over DC 295, CSXT and WMATA tracks and right-of-way and under PEPCO’s overhead power transmission lines which represents a significant utility conflict.

IBC 16-37: Fort Street Bridge over the Rouge River
Jeffrey Routhon, P.E., S.E., FASCE, Hardesty & Hanover, Okemos, MI; Jose Garcia, P.E., Michigan DOT, Lansing, MI
The Fort Street Bridge over the Rouge River is the second largest bascule leaf in the world, by deck area. It is 88 foot wide by 176 foot long and weighs over 8,000,000 pounds. Due to the efficient rolling-lift design, it requires minimal power to operate the bascule normally. Two 150-HP motors will move the bascule against the design ice and wind loads. Stringers, floorbeams, and two 13 foot deep pony trusses support the steel grid-reinforced concrete deck.

IBC 16-38: A New Bascule Bridge Over the Gut - South Bristol, Maine
Peter Roody, P.E., Hardesty & Hanover, LLC, New York, NY; Joyce Taylor, P.E., Maine DOT, Augusta, ME
A new Cable Stayed Bascule Bridge is being constructed across the Gut in South Bristol, Maine. The final bridge concept was developed with the local community’s input. The project includes the bridge replacement (including foundations), construction of an operator’s house, new traffic warning systems, approach work and a temporary runaround. Key challenges included a highly congested worksite, bedrock with no overburden, heavy year round navigation (over 8000 openings per year), and traffic maintained throughout construction.

IBC 16-39: Unique Design Challenges Associated with a 643’ Wide Steel Plate Girder Bridge
The rehabilitation of seven adjacent bridges over the Vine Expressway (Interstate-676) in Philadelphia, PA, included combining two adjacent bridges to create a 643’ wide bridge in order to expand Shakerne Park. Designing for the unusually high seismic forces as well as the extreme transverse thermal movements associated with such an uncharacteristically wide bridge presented one of several unique design challenges that will be addressed as part of this presentation.

IBC 16-40: Construction of Precast Concrete Simple-Supported Box Beams on Changsha Maglev Line, China
Guo-rang Chen, Ph.D. and Gong-lian Dai, Prof., Central South University, Changsha, Hunan, China; Y. Frank Chen, Prof., Penn State University, Harrisburg, PA
Changsha maglev line, completely developed in China, is 18.54km long, connecting between the city’s main railway station and the international airport. This maglev line is predominantly composed of simple-supported bridges (80%). All simple-supported beams were prefabricated in a factory and assembled in place. The whole construction took only fifteen months to complete. This paper will describe and discuss the rapid construction method and the mechanical properties the maglev simple-supported beams.

IBC 16-41: Honolulu Rail Transit Project – Precast Segmental Solution for Success
Jose Rodriguez, FIGG Bridge Inspection, Inc., Exton, PA
The Honolulu Rail Transit Project (HRTP) in Honolulu, Hawaii is a twenty-mile elevated light rail line being constructed by the Honolulu Authority for Rapid Transit (HART) that will connect West Oahu with downtown Honolulu. Precast segmental construction was selected for speed and quality of construction and long term durability. Most of the aerial guideway structure is being constructed down the median of existing roadways while maintaining traffic on these important links in the local roadway network.

IBC 16-42: Design Challenges of the Light Rail Transit Overhead Crossing Seismic Fault Zones
Sami Megally and Fatemeh Kavianpour, Kleinfelder, San Diego, CA
The Light Rail Transit Overhead, San Diego, California, is a 12-span bridge crossing over an active heavy railroad. The project has significant geometric, constructability, traffic, and seismic design challenges. The most significant challenge is the bridge crossing of a major seis-
mic fault with substantial ground movements. The bridge is designed and detailed to accommodate these severe conditions. This paper focuses on the design of bridges for such extreme conditions using this bridge as a case study.

IBC 16-43: Dallas Streetcar - Rehabilitation of the Houston Street Viaduct
Greg Kochersperger and John Quintero, HDR, Dallas, TX
The City of Dallas secured a TIGER grant in 2011 to construct a modern streetcar line between downtown and Oak Cliff across the Trinity River. The line would utilize the historic Houston Street Viaduct, a 100 year old concrete arch bridge, for this critical link. This paper will highlight the specific challenges and techniques used to rehabilitate and repurpose the bridge for streetcar use.

IBC 16-44: Construction and Span Replacement for CSX Bridge over Potomac River
John Boschert, Genesis Structures, Kansas City, MO; Matt Struemph, OCCI, Fulton, MO
CSX Bridge 64 is a double-truss bridge near Cumberland, Maryland and consists of three-150’ spans. The bridge was successfully replaced during a multi-phased project, highlighted by the main span replacement during a 34-hour closure. Following erection of the new 900-ton bridge spans adjacent to the existing bridge on temporary falsework supports, accelerated bridge construction techniques were executed using independent sliding systems for removal of the existing bridge and for installation of the new DPG spans.

IBC 16-45: Rail Structure Interaction Analysis - Fundamentals and Modeling Considerations
Douglas Heath, P.E., Paul Kim, Latif Ebrahimnejad, Ph.D., and Firooz Panah, P.E., AECOM, Boston, MA
This presentation summarizes rail-structure-interaction (RSI) analysis experience gained from a major light rail project in the Middle East. The project involved nearly 20km (12.4 miles) of viaduct connected to continuously welded rail using direct fixation fasteners. The presentation highlights structural modeling details which are useful for RSI analyses. Further, it provides perspective on the effect of different bridge characteristics (e.g. geometry and boundary conditions) on structural behavior.

DESIGN 2
Thursday, June 9; 1:30–5:00pm

IBC 16-46: Reconstructing the I-55 and Lake Shore Drive Interchange
Christopher Stine, AECOM, Chicago, IL
The I-55 and Lake Shore Drive Interchange is located two miles south of downtown Chicago and joins the north end of I-55 to U.S. Route 41 (Lake Shore Drive). Replacing a highly deteriorated interchange with more durable structures was hampered by the desire to provide additional lanes during construction and eliminate two planned detours. This project was IDOT’s first large-scale use of thermal-spraying (metalizing) that was used to protect over 7,500 tons of structural steel.

IBC 16-47: Bridge over the Vistula River in Kamien
Adam Igielski and Wojciech Jarominiak, CH2M, Warsaw, Masovian, Poland
The presentation will raise issues concerning the design and construction of a bridge over the Vistula River in Kamien. It is one of the longest bridges in Poland and is situated in a protected area of ecological importance in the EU. The bridge is 1039.9 m long and has ten spans (2x80m + 8x108m). The superstructure is a steel orthotropic box continuously working with a fiber reinforced concrete slab.

IBC 16-48: VDOT Staff Designs the 1,910 ft. Continuous Bridge on Route 340 over South Fork Shenandoah River
Junyi Meng, Virginia DOT, Richmond, VA; Eulagio Javier, Il and Ashraf Antonius, Virginia DOT, Staunton, VA; Mohamed Ali, Virginia DOT, Suffolk, VA
The existing Route 340 steel deck truss bridge was built in 1941. The new continuous 1,910 ft. steel plate girder bridge will feature six travel lanes with bike and pedestrian facilities. This will be the longest joint-less bridge in Virginia. The unique Virginia Abutment was employed to accommodate significant thermal movements. VDOT engineers were engaged to design this bridge, utilizing multiple materials and technologies to achieve an aesthetically pleasing and sustainable low maintenance structure.

IBC 16-49: Route 72 Manahawkin Bay Bridges Project, New Parallel Bridge
Steve Esposito, Joseph Mumber, and David Rue, WSP | Parsons Brinckerhoff, Lawrenceville, NJ; Pankesh Patel, NJDOT, Trenton, NJ
Route 72 in Ocean County, NJ is the only connection to Long Beach Island and is critical for hurricane evacuation. To increase redundancy, a new 17-span, 2,400 feet long parallel bridge is designed to withstand a 2,500 year earthquake and support critical utilities. The structure’s piers are founded on six-foot diameter drilled shafts and support 79” deep prestressed beams with 150’ maximum span length and a 55-foot vertical clearance over the Atlantic Intracoastal Waterway.

IBC 16-50: Calibration of Service Limit States for Concrete in AASHTO LRFD Bridge Design Specifications
Wagdy Wassef, AECOM, Mechanicsburg, PA; Hani Nassif, Rutgers University, Piscataway, NJ; John Kulicki, Madjeski and Masters, Mechanicsburg, PA; Dennis Mertz, University of Delaware, Newark, DE
The strength, or ultimate, limit states (ULS) of the AASHTO LRFD were calibrated through structural-reliability theory to achieve a certain level of safety. Exceeding the strength limit state results in a collapse or failure. Unlike strength limit states, the consequences of exceeding the service limit states are not well defined and these limit states were not statistically-calibrated. This paper presents the work performed to statistically calibrate the service limit states for concrete.

IBC 16-51: Experimental Performance Assessment of Spliced Continuous Prestressed Concrete Girder Bridges
Reza Baie, Mary Beth Hueste, and John Mander, Texas A&M University, College Station, TX
This paper presents a competitive design approach for bridges spanning between 200 to 300 ft. In-span splicing technique is adapted along with taking advantage of a load balancing design approach to propose an economical spliced concrete girder bridge. Based on experimental observations and measurements on a full scale specimen, as well as meticulous numerical modeling, recommendations for design, construction sequence, and splice detailing will be presented.

FOUNDATIONS
Thursday, June 9; 1:30–5:00pm

IBC 16-52: Lateral Resistance of Abutment Piles Near Mechanically Stabilized Earth Walls
Kyle Rollins, Ryan Budd, and Andrew Luna, Brigham Young University, Provo, UT; Robert Gladstone, Association for Metallically Stabilized Earth, Reston, VA
Pile foundations at bridge abutments often resist lateral loads produced by earthquakes and thermal change. When a mechanically stabilized earth (MSE) wall is used at an abutment, little guidance is available in designing for lateral load. In this study 16 lateral load tests were performed on piles at different distances behind a 20-ft high MSE wall. P-multipliers were developed to account for reduced lateral resistance and equations were developed to predict increased reinforcement tensile force.

IBC 16-53: Sellwood Bridge: Foundation Engineering to Optimize Construction
Foundations for the Sellwood Bridge in Portland include groups of large drilled shafts designed to bear 20 ft into hard basalt bedrock. At places, this resulted in shafts over 200-ft deep. The design didn’t rely on base resistance until a embedment of 20-ft into the bedrock. Post-award, the contractor proposed a Value Engineering study to reduce the length and mitigate construction risks. The VE was accepted so long as the proper QA was performed during construction by the foundation engineer.
IBC 16-54: Foundation Design of Abraham Lincoln Bridge under Design-Build Realm
Dan Yang, COWI North America (Formerly Buckland & Taylor|COWI NA), North Vancouver, BC, Canada; Yu Zhang and Sam Christie, COWI North America, Seattle, WA
This paper will focus on how structural and geotechnical designers worked together with the contractor to address the design needs for the cable-stayed bridge foundations. Under the design-build realm, this will encompass both bidding efforts and final design solutions using the state-of-the-art testing technologies, and resolving on-going construction issues, including retrofitting a defective 12-foot diameter drilled shaft supporting the tower. This paper emphasizes the collaboration between the contractors and the designers under the design-build environment.

IBC 16-55: The Virginia Route 340 Bridges: Challenges for Foundations in Karst Terrain and the Importance of Coordination during Design and Construction
Jim Sheahan, HDR Inc., Pittsburgh, PA; Chaz Weaver, Virginia DOT, Staunton, VA; Michael Mo, HDR Inc., Norfolk, VA
What does it take to successfully complete a bridge project? While the technical capabilities and experience of those involved in design and construction are clearly important, the inter-discipline communication during design and construction can also be critical to a successful project. Case studies for two bridges in Virginia using micropile and H-pile foundations with karst-related, variable conditions will illustrate how coordination between geotechnical engineers, structural engineers and the construction staff resulted in a successful project.

IBC 16-56: TDOT Loudon Bridge No. 3 VEAC Design to Construction
Timothy Siegel, Dan Brown and Associates, PC, Knoxville, TN; Mark Madgett, Seaboard Foundations, Inc., Blountville, TN
The State of Tennessee designed a new bridge over the Tellico Canal in Loudon County, Tennessee. As is typical for many State projects of this type, the bridge was to be constructed on rock-bearing spread foundations that would involve challenging techniques in a karstic geology. Furthermore, it would require rock excavation and likely blasting near the existing bridge. At the request of the general contractor for the project Charles Blalock & Sons, the team of Seaboard Foundations, Inc., Dan Brown and Associates, PC, and Bittner-Shen Consulting Engineers, prepared an alternate design consisting of rock-socketed drilled shafts. An innovative aspect was the use of concrete forms that were lifted in place and then temporarily anchored using the drilled shafts. For each bent, the concrete form was lowered to the rock surface, dewatered, and then used as the base for installation of the cap. The alternate achieved its purpose by saving time and helping to minimize problems at a site with numerous challenges.

IBC 16-57: Augered Cast-in-place Piles for Bridge Foundation Support
Morgan NeSmith, Berkel & Company Contractors, Inc., Austell, GA
Although Augered, Cast-in-place (ACIP) piles are commonly used in highway construction for embankment, soundwall and MSE wall support, there remains a reluctance among state agencies to approve the technology for support of bridge foundations. FHWA Geotechnical Circular 8, The Design and Construction of CFA Piles, was developed to provide a framework for the inclusion of these piles in state-level highway foundation support. The author will present three relatively recent case histories where ACIP piles were used for bridge approach support, temporary support of a tower-crane for bridge construction, and the direct support of an elevated roadway in an urban area, respectively. Additionally, the author will present recent developments in the areas of automated installation monitoring and non-destructive testing that can provide a level of certainty regarding the integrity of constructed ACIP piles to allow their inclusion as foundation support for all aspects of transportation projects.

IBC 16-58: I-90 Dresbach Bridge Over the Mississippi River
John Dvorak, FIGG Bridge Inspection, Inc., Winona, MN; Eric Breitsprecher, MnDOT, Winona, MN
The new Interstate 90 Dresbach Bridge over the Mississippi River between La Crescent, Minnesota and La Crosse, Wisconsin will be a highly utilized river crossing serving as a gateway for regional and interstate needs and as a local connection for the adjacent communities. MnDOT is replacing the deficient I-90 structure with a new, modern, and ecologically conscious four-lane concrete bridge. The design inspiration for the new river bridge comes from the natural, picturesque landscape of the surrounding area.

IBC 16-59: Design of Riyadh Metro System Segmental Viaducts, Lines 1 and 2
Frooz Panah, P.E., Latif Ebrahimnejad, Ph.D., and Paul Kim, P.E., AECOM, Boston, MA; Brian Guzas, P.E., AECOM, Providence, RI; Ahmad Abdel-Karim, P.E., AECOM, Sacramento, CA
The Riyadh Metro Project is commissioned and supervised by Arriyadh Development Authority (ADA), the executive arm of the high Commission for the Development of Arriyadh. Designed by AECOM, BACS consortium (consisting of Bechtel, Almabani, CCC, and Siemens) is constructing over 21 km of precast segmental viaducts for Lines 1 and 2 of the project. The approach that the design-build team took to create this world class transit system is discussed and presented in this paper.

IBC 16-60: Lesner Bridge - A New Signature Bridge for the City of Virginia Beach
Christopher Ursery, P.E., FIGG Bridge Inspection, Inc., Tallahassee, FL
Virginia Beach’s new Lesner Bridge has created excitement for both the local community and the thousands of tourists who visit Coastal Virginia each year. The new signature bridge, designed by FIGG, crosses the Lynnhaven Inlet along the Atlantic Coast and features two 1575-foot-long twin precast segmental concrete bridges. This paper explains various challenges encountered during the development of the new Lesner Bridge and highlights the construction methods used to build the new signature bridge.

IBC 16-61: Temporary Support of Balanced Cantilever on Bearings
David Konz, P.E., S.E., Atkins, Tampa, FL
The River Dee and River Don Crossings are sister CIP Segmental structures (394 foot mainspan) within the Aberdeen Western Peripheral Road PPP. The 91 foot wide, single-cell boxes will be erected with balanced cantilevers resting on the permanent bearings. The temporary props consist of two, post-tensioned concrete columns (63 inch square), each designed to carry cyclical compression and tensile loads from the erection moments. The props were placed just 16 foot away from the column on top of the permanent footings.

IBC 16-62: Detection of Voids, Soft Grout and Tendon Corrosion in Internal Bridge Post Tensioning Ducts
Paul Fisk and Benson Armitage, NDT Corporation, Sterling, MA
Open voids and soft grout in post tensioning ducts create an environment where strand corrosion can occur and if not detected and remediated, strands could fail, potentially causing a bridge to fail. Cost-effective ways of locating and quantifying voided and soft grout conditions in PT ducts are important for planning and budgeting remedial actions. NDT Corporation has successfully used nondestructive testing methods to identify specific locations within internal post tensioning ducts where grout voids and soft grout exist.

IBC 16-63: Winona Bridge over the Mississippi River - MnDOT’s First CMGC Project
John Dvorak, FIGG Bridge Inspection, Inc., Winona, MN; Eric Breitsprecher, MnDOT, Winona, MN
The historic Winona Bridge carries Highway 43 over the Mississippi River at Winona, Minnesota. A new 2,300’ long bridge is being constructed with a 450’ concrete segmental main span that will eventually carry two southbound lanes, shoulders and a pedestrian path. After
rehabilitation, the existing bridge will carry two northbound lanes. To accelerate the project, MnDOT utilized the Construction Manager/General Contractor (CMGC) method of project procurement for the first time. This allowed construction to move forward while under design and saved approximately one year in the overall project schedule.

**REHABILITATION 2**

**Thursday, June 9; 1:30–5:00pm**

**IBC 16-64: Rehabilitation of the Historic Richland Avenue Bridge, Athens, Ohio**

William Vermes, Jones-Stuckey, A Division of Pennoni, Akron, OH

The project began as a deck replacement of an 80-year-old bridge, but research quickly identified it as one of the first continuous steel girder bridges in the United States. With encouragement from the owner, the rehabilitation economically preserved elements of the bridge’s historic fabric, including reuse of the original cast-in-place concrete rails, which typically would have destroyed. Additionally, the bridge closure was limited to a tight closure window to accommodate the adjacent Ohio University academic calendar.

**IBC 16-65: Cable Replacement Work on Multiple-Span Cable-Stayed Bridge: Nhat Tan Bridge in Vietnam**

Tamonabu Tokuchi, Kenji Matsuno, Naoya Taki, and Victor Maina, IHI Infrastructure systems Co., Ltd., Sakai, Osaka, Japan

The stay cable replacement work processes with various locations in height and length for Nhat Tan Bridge which is located in Hanoi, Vietnam, are described. The work was performed and completed just prior to the public opening. Five out of 220 stay cables for a six span continuous cable-stayed bridge were replaced in 40 days at the site. This replacement method can be applied to existing cable stay bridge rehabilitation works.

**IBC 16-66: Rehabilitation and Strengthening of Two Bridge Piers using Galvanic Anodes, and Conventional Reinforcement versus FRP System**

Hari Aamidala, Alpha Corporation, Dulles, VA; Edmund Ökerchiri, Virginia DOT, Fairfax, VA

As part of VDOT’s bridge preventive maintenance and rehabilitation efforts, two bridge rehabilitation projects with piers with similar levels of deterioration were identified for repair with galvanic protection systems. Strengthening of the pier caps is achieved using FRP System at one bridge, while the size of the Pier Caps was increased with additional reinforcing bars at the other bridge, which would allow us to observe relative performance over the years.

**IBC 16-67: Rehabilitation and Seismic Retrofit of the North Torrey Pines Road Bridge**

Keith Gazaway, Nathan Johnson, and Mark Creveling, Kleinfelder, Inc., San Diego, CA

The historic and structurally deficient North Torrey Pines Road Bridge in San Diego County required extensive seismic upgrades and significant repairs to corrosion. This coastal project navigated complex political, engineering, economic, and environmental constraints in an effort to preserve the visual character of a landmark bridge. Ultimately, a nonlinear time history seismic analysis combined with creative construction techniques led to successful implementation of a unique and elegant retrofit and rehabilitation strategy.

**IBC 16-68: Bridge within a Bridge - A Practical Approach for Stone Masonry and Concrete Arch Preservation**

Joseph Spadea, Pennoni, Newark, DE; William Cameron, Pennoni, Mechanicsburg, PA

How do you rehabilitate a 100 year old stone masonry and concrete arch bridge without impacting its natural aesthetics? Factor in that the bridge is the only access point for a prominent Philadelphia family, relatives of renowned architect Frank Furness. The Furness Bridge is a 100-ft. crossing spanning Ridley Creek in Media, PA. With one of the bridge’s three arch spans partially collapsed, Pennoni proposed a unique design – construct a new bridge within the existing.

**IBC 16-69: Fracture Behavior of Damaged Steel Bridge Members Repaired through Heat-Straightening**

Kaiyuan Liu, Parsons Corporation, Seattle, WA; David Mukai, Dr., University of Wyoming, Laramie, WY

This paper discusses the fracture behavior of heat-straightened steel plates with strain ratios up to 200, while the current limiting strain ratio for heat-straightening is 100. Unprecedentedly, the crack resistance curve (or the J-R curve) is applied to describe the stable crack growth rate and crack length of heat-straightened steel. Some findings on fatigue resistances are discussed as well. The conclusion is that heat-straightening of a damaged steel bridge member may not be recommended under some circumstances.

**TECHNICAL SESSIONS**

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**TECHNICAL SESSIONS**

**Friday, June 10; 8:00am–12:00 noon**

**IBC 16-70: Unique Pi Girder Design offers Functional Solution for Multimodal Bridge Structure**

Rebekah Gaudreau and Keith Donington, Parsons Brinckerhoff, Manchester, NH

Bridge 1 over the Piscataqua River provides vehicular, rail, and pedestrian access to the Portsmouth Naval Shipyard. The original 300’ long, 4-span bridge consisted of steel through girders and cantilevered sidewalks. Innovative steel plate girder shapes like the Greek letter Pi were used to address the heavy rail loading and structural depth limitations. This unique design improved the functionality of the structure by moving the entire support system below deck, creating an open concept solution.

**IBC 16-71: Replacing H Street Bridge in Washington DC**

John Hinman, CH2M, Boise, ID; Ali Shakeri, District DOT, Washington, DC; Kathleen Linehan, CH2M, Washington, DC

Replacing H Street Bridge across Grand Central Station must not only accommodate 26 existing tracks and two city streets, but must allow for relocation of many of those tracks. Commercial development above Grand Central Station requires mid-span access. Foundations for the new bridge must allow future excavation for two levels of concourses and train tracks below the existing at-grade tracks, without disrupting train movement on the existing tracks or damaging the H Street Bridge foundations.

**IBC 16-72: Design Innovations for the Eastbound George V. Voinovich Bridge**

Steven Stroh, AECOM, Tampa, FL

The George V. Voinovich Bridge spans Cuyahoga River valley in Cleveland Ohio, and is approximately 3,000 foot long. It utilizes an innovative steel delta girder that is integral with the piers and supports a plate girder superstructure above. This delta girder arrangement reduces the effective span of the plate girder framing from the maximum 361 feet between piers, to maximum 231 feet between bearings on the delta girders. It simplifies fabrication, erection and reduces cost.

**IBC 16-73: Advances in FRP Composites in Transportation Infrastructure**

Jerome O’Connor, P.E., Institute of Bridge Engineering, Buffalo, NY; Wayne Frankhouse, Jr., P.E., Maine DOT, Augusta, ME

A scan team consisting of seven state DOT engineers scanned the U.S. in 2015 to identify the most prevalent uses of fiber reinforced polymer (FRP) composites in highway infrastructure. The presentation will summarize the applications identified as being mature and ready for widespread use. In mature applications, the FRP’s behavior is well understood and documented as a result of research and development; mathematical models have been validated by laboratory testing under controlled conditions; design and construction guidelines have been vetted by experts and users in the field; trial applications have been undertaken and evaluated; and the performance is being monitored under service conditions. Less common uses will also be discussed, citing knowledge gaps and other factors that may be hindering use by the civil engineers.
TECHNICAL SESSIONS

IBC 16-74: Artful Bridges: VDOT/Arlington County Artwork Collaboration for the Route 50/Courthouse Road/10th Street Interchange, Arlington, Virginia
Angela Adams, Arlington Public Art, Arlington, VA; Calvin Britt, P.E., Virginia DOT, Fairfax, VA; Michael Jelen, P.E. and Elliott Mandel, P.E., AECON, Arlington, VA
A unique collaboration between agencies and designers led to the transformation of a bridge project into the first large-scale, integrated public art project attempted by VDOT. The interchange features bridge and wall structures that incorporate striking artwork. The approach promotes community identity, environmental awareness and aesthetics, transforming infrastructure into creative places. The project demonstrates that bridges can serve as a forum for the integration of public art, transforming their function into a multi-faceted transportation project.

IBC 16-75: Utilizing Unmanned Aerial Systems (UAS) for Bridge Inspections
Jennifer Zink, Minnesota DOT, Oakdale, MN; Barrett Lovelace, Collins Engineers, St. Paul, MN; Tara Kalar, Minnesota DOT, St. Paul, MN
The Minnesota Department of Transportation and Collins Engineers have been researching the use of Unmanned Aerial Systems (UAS) as a tool for bridge inspections. Phase I of an implementation study has been completed and a Phase II study is underway. These research studies look at current FAA regulations and are evaluating the advantages and challenges of using UAS for bridge inspections with promising results.

IBC 16-76: GRS-IBS Design and Construction: 27th Street Bridge over Broad Branch Stream, Washington, DC
Zahra Dorniz, P.E., District DOT, Washington, DC; Michael Jelen, P.E. and Elliott Mandel, P.E., AECON, Arlington, VA
Replacement of the 27th Street Bridge is the District of Columbia’s first use of the Geosynthetic Reinforced Soil-Integrated Bridge System (GRS-IBS). This simplified construction approach resulted in higher durability, a shortened schedule, reduced costs and an ability to be built by general labor trades. The design used recommendations from the FHWA/Turner-Fairbanks Highway Research Center. This project provides further understanding of GRS-IBS leading to wider implementation of the technique in Washington, DC and across the country.

DESIGN 3
Friday, June 10; 8:00am–12:00 noon

IBC 16-77: University Drive over I-75: Design-Build Spawns Innovation
Maria Quagliato, Bergmann Associates, Lansing, MI
The University Drive over I-75 design-build bridge replacement project in Auburn Hills, Michigan included construction of the first Diverging Diamond Interchange in the state of Michigan. Innovations and unique cost saving measures that were developed in collaboration between the designers and the contractor to reduce construction costs will be discussed. These included significantly reducing the bridge skew and realigning the interchange to avoid deposits of soft organic soils near the existing abutments.

IBC 16-78: Ultimate and Fatigue Responses of UHPFRC-Filled, Transverse Angle-Joint in Full-Depth, GFRP-Reinforced, Precast Bridge Deck Panels
Mahmoud Sayed Ahmed and Khaled Sennah, Ryerson University, Toronto, ON, Canada
The laterally restrained precast full depth deck panel (FDDP) was constructed with transverses joint resting over steel twin girders. The 200-mm thick precast FDDP is made of normal strength concrete and reinforced with GFRP bars. The transverse angle-joint has 175-mm of projected GFRP bars, female shear key, bottom tongue, and joint-filled with Ultra High Performance Reinforced Concrete (UHPFRC). Ultimate monotonic load, constant fatigue and variable fatigue loading were performed under truck wheel footprint showed good results.

IBC 16-79: Design Challenges of the Embarcadero Bridge over Lake Merritt Channel
Natalie Calderone and Hohsing Lee, AECON, Sacramento, CA; Nader Rababat, City of Oakland, Oakland, CA
The City of Oakland’s new Embarcadero Bridge over Lake Merritt Channel is owned by the City of Oakland and had many challenges encountered during both the design and construction phase including one challenge of an existing sewer line less than 12-ft away that’s to remain fully operational and undamaged during construction, a high-seismic zone with Bay mud, extended overhangs requiring transverse post-tensioning, and various aesthetic requirements including customized railings, lights, and pedestrian overpasses. This presentation will describe complicated design and construction and show how the challenges were addressed.

IBC 16-80: Innovative Use of Precast Concrete Girder in Urban Grade Crossing
Yuling Tao, City of Seattle DOT, Seattle, WA; Hong Guan and Mark Johnson, CH2M HILL, Bellevue, WA
The highly unusual Y-shaped geometry of the East Marginal Way Grade Separation and tight vertical clearance over railroad tracks called for an innovative solution that enables accelerated bridge construction, minimum construction impacts to railroad operations, and an economical and low lifecycle cost bridge. The solution was a creative use of precast concrete girders by pre-cambering method. The project has to-date one of the largest pre-cambered geometry of precast/prestressed I-girders in the State of Washington.

IBC 16-81: I-49 Lafayette Connector
Kenneth Butler, AECON, Glen Allen, VA; Zhengzheng “Jenny” Fu, LADOTD, Baton Rouge, LA
The I-49 Lafayette Connector project consists of a significant amount of structure and bridge including: 3.5-miles of elevated mainline viaduct; a signature arch or cable stayed bridge; 20 ramp connectors; 3-level interchange; 3 railroad bridges; and a bridge over the Vermillion River. The total bridge deck area is approximately 2,900,000 square feet. A major element of the project is evaluating life cycle costs for the mainline viaduct including steel box girders; prestressed concrete u-girders and precast segmental box girders. Additionally, context sensitive solutions are being developed based on community input. The focal point of the project will be a signature arch or cable stayed bridge. The presentation will focus on the early design development of the project and how the community is being engaged.

IBC 16-82: In-Depth Finite Element Analysis of the Seventh Street Self-Anchored Suspension Bridge
Aaron Calorito, P.E., Richard Schoedel, P.E., and Donald Marburger, P.E., Michael Baker International, Moon Township, PA
The Andy Warhol Bridge is an eye-bar chain, self-anchored suspension bridge carrying Seventh Street over the Allegheny River in the city of Pittsburgh, PA. This bridge is one of the “Three Sisters” bridges constructed from 1924 to 1928 which comprise the only trio of identical, side-by-side bridges in the world and the first self-anchored bridges constructed in the United States. An in-depth, three-dimensional finite-element analysis is carried out to identify rehabilitation needs of this unique structure.

IBC 16-83: Ship & Barge Collisions with Highway Bridges
Michael Knott, Moffatt & Nichol, Richmond, VA; Mikele Winters, Moffatt & Nichol, Raleigh, NC
Recent decades have demonstrated the potential vulnerability of major highway bridges to catastrophic collapse due to extreme event loads. The paper will discuss ship and barge collision with bridges over navigable waterways using lessons learned from historical accidents; analysis procedures in the AASHTO Vessel Collision Design of Highway Bridges, 2nd Edition 2009 for both new and existing bridges; and application of AASHTO risk analysis procedures to complex navigation channel geometries near bridges.
REHABILITATION 3
Friday, June 10; 8:00am–12:00 noon

IBC 16-84: Bronx Whitestone Bridge: Approach Widening
Roger Haight, WSP | Parsons Brinckerhoff, New York, NY; Ronald Paproksi, WSP | Parsons Brinckerhoff, Briarcliff Manor, NY; Christopher Saladin, MTA Bridges and Tunnels, Bronx, NY
The TBJA widened both approaches on New York’s Bronx Whitestone Bridge. The new approach structures provide six AASHTO standard traffic lanes, full-width standard shoulders and a median barrier, with expansion capacity for an additional lane in each direction for future demand. The widened structures comprise cast-in-place concrete piers; redundant, multi-span continuous roadway girders; and a composite cast-in-place concrete roadway. Ancillary features of the projects include a neighborhood park, a new maintenance shop, and noise walls.

IBC 16-85: Repair of Truck Impacted/Damaged Steel Beams, I-66 over Route 29, Fairfax County, Virginia
John Michels and Allireza Hedayati, Parsons Brinckerhoff, Herndon, VA; Edmund Okerchiri, VDOT, Fairfax, VA
The presentation will discuss the evaluation process and repair details for steel beam truck impact/collision damage to the NBL I-66 Bridge over Route 29. The discussion will include selecting a repair type, identifying repair challenges and achieving the desired service life for the owner. Repair methods to be discussed include: strengthening of bent girder flanges, temporary support for partial beam replacement, beam strengthening, bolted cover plates, diaphragm replacement, and cover plate weld inspection.

IBC 16-86: Rehabilitation of the Passyunk Avenue Bascule Bridge
Colin Drager, P.E. and Leon Lung-Yang Lai, Ph.D., P.E., S.E., Specialty Engineering, Inc., Bristol, PA; Timothy Gresham, P.E., Gresham Consulting, LLC, Chalfont, PA; Gregory Off, P.E., AECOM, Conshohocken, PA
The Passyunk Avenue Bridge is a double-leaf dual-structure bascule in the City of Philadelphia. Major rehabilitation of the bridge is underway. The key and unique design items include heat-straightening of the damaged fracture-critical girders, replacement/redesign of the non-functioning center locks, new FRP bike lane decks, installation of a debris shielding system under the open-grid deck, and installation of a new wireless controlling system to replace the existing under-channel electric cable system.

IBC 16-87: Iowa DOT Bridge Deck Expansion Joint Maintenance Program and Research Overview
James Nelson, Iowa DOT, Ames, IA; Charles Jahnke, Iowa State University, Ames, IA
In 2012, the Iowa DOT began an aggressive contract maintenance program to repair and replace bridge deck expansion joints. In order to more effectively implement the contract maintenance repair program, research was sponsored including rapid expansion joint replacement investigation and an effort to standardize details for semi-integral abutments for bridge joint retrofits. This paper presents an overview of the contract maintenance program, and associated research results.

IBC 16-88: I-64 Dunlap Creek Bridge Deck Rehabilitation - Jointless Bridges, Deck Overlays, and Concrete Materials
Celik Oguldemir, Gail Maruzza, and Harikrishnan Nair, Virginia DOT Research Council, Charlottesville, VA; Ikhyeon Kim, Virginia DOT, Staunton, VA
Chlorides leaking into joints and cracked concrete decks are costly stressors of bridge structures. Joint and bridge deck protection were addressed in two bridges on I-64 in Virginia. Joints were replaced with closure pors using innovative fiber reinforced concretes. For bridge deck protection, concretes with shrinkage reducing admixture or lightweight concretes were used in overlays. Initial surveys are showing that closure pors and experimental overlays are performing well.

IBC 16-89: Rehabilitation of Three Parallel Bridges Adjacent to the Lewiston Pump-Generating Plant
Mark Horschel, P.E., Bergmann Associates, Rochester, NY; John C. (Curt) Baker, P.E., Oak Grove Construction, Elma, NY
This $41.3 million bridge rehabilitation project included the staged superstructure replacement of three adjacent 813 ft. long bridges carrying I-190 NB & SB and the NY Route 265 Bridges over the New York Power Authority reservoir in Niagara County, NY. The project included removal of the existing 12 span post-tensioned concrete girder superstructure for each bridge and replacement with three sets of 4-span continuous galvanized steel multi-girder superstructures. Pre-engineered platforms were used for debris containment.

IBC 16-90: Developing a Corrosion Mitigation Strategy for Service Life Extension
Rex Gilley, WSP | Parsons Brinckerhoff, Virginia Beach, VA; Ali Akbar Sohanghpurwala, CONCORR, Inc., Sterling, VA; Christopher Eggleston, VDOT, Suffolk, VA
Many states and federal entities are interested in extending the service life of aging infrastructure facilities. The Hampton Roads Bridge Tunnel approach trestles are exposed to an extreme marine environment and are exhibiting corrosion induced damage. Condition evaluations utilizing the latest testing protocols, service life modeling, and life cycle cost analyses produced optimal solutions for rehabilitation. The presentation will discuss the techniques used for evaluating and repairing existing structures, minimizing the need for costly replacement.

ABC
Friday, June 10; 8:00am–12:00 noon

IBC 16-91: 50 Day Complete Bridge Replacement
Adam Stockin, Keith Donington, and Karie-An James, Parsons Brinckerhoff, Manchester, NH
This bridge project used accelerated construction techniques to construct a 120’ precast prestressed buttressed box beam span to provide an economical and efficient solution within 50 days. This span alleviated the need for a pier in the river, thereby reducing construction time and future maintenance. Several unique details were developed to accommodate this 45 degree skewed bridge and lessons were learned that will benefit engineers in the increasing demand to build bridges within short closures.

IBC 16-92: Bridge Replacement using Accelerated Bridge Construction
Charles Babcock, P.E. and Michael Wagner, P.E., C.C. Johnson & Malhotra, PC, Camp Hill, PA
There has been an increasing number of bridge replacement projects utilizing rapid bridge construction technologies. From roll-in construction to prefabrication to advanced materials, bridge engineers have been completing projects in fewer and fewer days of construction time. This paper describes the technical bridge challenges for two bridge replacements in Chester County, Pennsylvania. More importantly, it describes the non-structural engineering aspects that had to be overcome before and during construction to make such a project successful.

IBC 16-93: Substructure Considerations for Successful Accelerated Bridge Replacement Projects
David Whitmore, Vector Corrosion Technologies, Winnipeg, MB, Canada; Rachel Stifler, Vector Corrosion Technologies, McMurray, PA
This paper discusses substructure considerations for successful accelerated bridge replacement (ABR) projects and will present several ABR case studies completed by DOT’s in the USA and Canada. The presentation will include pre replacement condition, rehabilitation and construction details of each project. In order to realize the full benefit of ABR, serious consideration must be given to the existing substructure. Items to be considered are its structural capacity, its existing condition, and the options available to repair and/or extend its service life. The full benefit of ABR can be achieved if the existing substructure can be rehabilitated or otherwise modified to provide a service life which meets or exceeds a service life of the new bridge deck or substructure.
TECHNICAL SESSIONS

IBC 16-94: Low-Cost Bridge Solutions for Local Owners - GRS-IBS Abutment Bridges
Bryan Dietrich, P.E., RETTEW, Pittsburgh, PA; Dave Hoglund, P.E., RETTEW, Lancaster, PA

GRS-IBS abutment bridges are a cost-effective solution for local governments since they can be constructed by public works staff with assistance from the design engineer. This paper will discuss the various challenges encountered and solutions developed for three distinctive GRS-IBS bridge abutment projects. Notable challenges include: design/construction windows less than 6-months, skewed abutments, GRS construction inside existing abutments and wings, in-field adjustments to correct as-built errors, first-time construction by maintenance forces and limited access construction.

IBC 16-95: Evaluation of Modular Press-Break-Formed Steel Tub Girders for Short Span Bridge Applications
Gregory Michaelson, Marshall University, Huntington, WV; Karl Barth, West Virginia University, Morgantown, WV; Michael Barker, University of Wyoming, Laramie, WY; Daniel Snyder, Steel Market Development Institute, Washington, DC

This paper and presentation is focused on the development of modular shallow trapezoidal boxes fabricated from cold-bent structural steel plate using standard mill plate widths and thicknesses. This concept was developed by a technical working group within the Steel Market Development Institute’s Short Span Steel Bridge Alliance (SSSBA), led by the current authors. This paper will provide an overview of experimental testing and parametric studies focused on assessing the system’s behavior and performance.

The workshop program is designed to provide in-depth information on a specific topic. They are presented by experts in the field and are loaded with technical content. Each workshop will provide an opportunity for a technical exchange between the students, the instructor and other workshop participants. Workshop and SIS will provide attendees with professional development hours (PDHs). Preregistration is not required.

Tuesday, June 7

8:00am –12:00 noon
W-1: LRFD for Concrete Highway Bridge Superstructures
Presented By: FHWA; Speakers: Brian Kozy, Ph.D., P.E., FHWA; Scott Vannoy, P.E., Michael Baker International; Frank Russo, Ph.D., P.E., Michael Baker International; William Nickas, P.E., Precast/Prestressed Concrete Institute (PCI)

9:00am–12:00 noon
W-2: Load Rating and Posting of Locally Owned Bridges
Presented By: Federal Highway Administration

9:30am–12:00 noon
W-3: Enhancing Performance and Extending the Service Life of Concrete Bridges Using FRP Composites
Presented By: American Composites Manufacturers Association

1:00–5:00 pm
W-4: LRFD for Steel Highway Bridge Superstructures
Presented By: FHWA; Speakers: Brian Kozy, Ph.D., P.E., FHWA; Scott Vannoy, P.E., Michael Baker International; Frank Russo, Ph.D., P.E., Michael Baker International; Michael Grubb, P.E., M.A. Grubb & Associates, LLC

1:00–5:00 pm
W-5: Service Life Design and Engineering of Bridges

1:00–4:30 pm
W-6: Long Term Bridge Performance (LTBP) Program Update
Presented By: Michael Baker International

1:00–5:00 pm
W-7: International Bridge Engineering Practices

Wednesday, June 8

2:00–3:00 pm
SIS-1: Integrated Geometry, Design, and Analysis of Bridges following a BrIM Workflow
Presented By: Bentley Systems

2:00–4:00 pm
SIS-2: Extraction of Bridge Measurements, Features and 3D Models from Point Cloud Data
Presented By: Certainty 3D

2:00–3:00 pm
SIS-3: Corrosion protection and deck waterproofing on steel bridges
Presented By: Sika Services AG; Speaker: Dirk Uebelhoer, Sika Services AG, Stuttgart, Germany

Friday June 10

1:00–2:30 pm
W-8: Creating a world class safety culture
Presented By: Atena; Speaker: Tim Neubauer, Atena, Chicago, IL

1:00–2:00 pm
W-9: Design and Construction of Bridge Columns Incorporating Mechanical Bar Splices in Plastic Hinge Regions
Presented By: South Dakota State University; Speaker: Mostafa Tazarv, Ph.D., South Dakota State University, Brookings, SD

1:00–2:00 pm
W-10: The Rehabilitation of the Wichita US-54 CBD Viaduct
Presented By: WSP|Parsons Brinckerhoff; Speakers: Abdul Hamada, P.E. and Nichole Witsushinsky, P.E., WSP|Parsons Brinckerhoff, Wichita, KS

1:00–3:00 pm
W-11: Bridge Inspection and Evaluation Technologies and Applications

1:00–3:00 pm
W-12: Practical Application of Drones in the Bridge Industry
Presented By: UAV–US Aerial Video

IBC 16-96: Superstructure Replacement of U.S. Route 9 Southbound over Green Street Utilizing Accelerated Bridge Construction
Brian Atkinson, Laura Caley, and David Hicks, Dewberry, Bloomfield, NJ

Dewberry recently completed a $6,000,000 NJDOT project utilizing ABC techniques in a heavily congested section of U.S. Route 9 in Woodbridge, NJ. Initially identified for deck slab replacement, it became evident that conventional staged construction would cause major traffic disruptions. To shorten the construction duration, a superstructure replacement was recommended. Modular construction, coupled with a viable detour route and a complete weekend closure of Route 9 southbound, accelerated the schedule to achieve the project objectives.

IBC 16-97: Large Scale, High Production Preassembly of Girder Units for the New Tappan Zee Bridge
Tom Zieman, Zieman Engineering, LLC, Stamford, CT; Neil Napolitano, Tappan Zee Constructors, Tarrytown, NY

The new Tappan Zee Bridge consists of over two miles of plate girder approaches that are being built off-site in 135 preassemblies, which are up to 420 feet long and weigh up to 2200 kips. This presentation will focus on the yard where the units are being assembled and loaded on to barges at a rate of over 3,000,000 lbs. of steel per week. Various custom equipment which constitutes an assembly line will be described.

CONTINUING EDUCATION WORKSHOPS & SPECIAL INTEREST SESSIONS

Wednesday, June 8

2:00–3:00 pm
SIS-1: Integrated Geometry, Design, and Analysis of Bridges following a BrIM Workflow
Presented By: Bentley Systems

2:00–4:00 pm
SIS-2: Extraction of Bridge Measurements, Features and 3D Models from Point Cloud Data
Presented By: Certainty 3D

2:00–3:00 pm
SIS-3: Corrosion protection and deck waterproofing on steel bridges
Presented By: Sika Services AG; Speaker: Dirk Uebelhoer, Sika Services AG, Stuttgart, Germany

Friday June 10

1:00–2:30 pm
W-8: Creating a world class safety culture
Presented By: Atena; Speaker: Tim Neubauer, Atena, Chicago, IL

1:00–2:00 pm
W-9: Design and Construction of Bridge Columns Incorporating Mechanical Bar Splices in Plastic Hinge Regions
Presented By: South Dakota State University; Speaker: Mostafa Tazarv, Ph.D., South Dakota State University, Brookings, SD

1:00–2:00 pm
W-10: The Rehabilitation of the Wichita US-54 CBD Viaduct
Presented By: WSP|Parsons Brinckerhoff; Speakers: Abdul Hamada, P.E. and Nichole Witsushinsky, P.E., WSP|Parsons Brinckerhoff, Wichita, KS

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