Abstract #: 17-175  
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Score: ________

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**Title:** Low-Frequency Impact Testing of Reinforced-Concrete (RC) Bridge Beams  

**Primary Topic:** Non-Destructive Testing  
**Secondary Topic:** Bridge Maintenance  

**Project Information**  
**Name:** Rehabilitation of Bridges on M2 - European Corridor 8  
**Location:** Republic of Macedonia  
**Opening Date:** 2/1/2001  

An aging bridge infrastructure presents challenges to transportation infrastructure owners on how to cost-effectively inspect, test, and repair bridges. The NDT impact procedure presented in this paper is one method to rapidly scan and identify potential deteriorations in bridge RC beam steel-concrete bonding condition to identify effective maintenance protocols.

**Abstract:**

The performance of reinforced-concrete (RC) bridge beams in tension is dependent on the interface reaction between the steel reinforcing and the concrete. Under conditions of moisture and sustained cyclic loading the interface bonding between concrete and steel can be degraded. To sustain bridge performance a method to find and identify de-laminations between concrete and steel is necessary. This paper presents a method of using low-frequency impacts, based on the impact-echo principle, to identify areas of de-bonding between concrete and steel in RC bridge beams. The objective is to provide a testing method for bridge inspectors and maintainers to rapidly scan and evaluate the condition of bridge concrete beams to determine if de-laminations have occurred between steel reinforcing and concrete. Using a light mobile impact machine which provides multiple impacts per meter across a bridge beam low-frequency signals are generated reflecting the condition of the bonding between the concrete and steel reinforcing. Signal analysis of the recorded impact sounds provides a profile of the steel-concrete bonding condition and can provide indications of de-laminations and possible degraded bridge performance. Specific pulse waveforms and impact frequencies provide an accurate indication of steel-concrete bonding condition. Finding and detecting degraded steel-concrete bonding condition in bridge beams can provide information on necessary maintenance intervention to sustain long-term bridge performance. The goal is to provide bridge engineers and maintainers a non-destructive testing procedure to rapidly evaluate long lengths of RC bridge beams to determine and to eventually sustain bridge performance.
The Louisville-Southern Indiana Ohio River Bridges Project consists of two new major bridges over the Ohio River in Louisville, Kentucky, interstate highway extensions in Indiana and Kentucky, and several major interchange reconstructions. Indiana is responsible for the East End Crossing (EEC), which is a design-build-finance-operate-maintain availability payment style Public-Private Partnership (P3) with a 35-year operating term. The EEC scope includes a 2,300-foot cable-stay bridge linking Prospect, Kentucky in northeast Louisville to Utica in Southern Indiana, a 1,700-foot twin bore tunnel, and eight miles of new-terrain highway. The EEC Project is using the innovative horizontal sustainability evaluation system Envision™ and anticipates achieving at least a Gold level of certification. As Indiana Department of Transportation’s (INDOT’s) largest P3 project to date and the only one involving new construction, when this $763 million project is complete in late 2016, it is anticipated to be one of the largest single infrastructure projects in North America to be third-party certified by a horizontal infrastructure sustainability rating system. Furthermore, it will be first application of Envision™ to a major river crossing. Owner’s representatives will describe the Envision rating system, specifically credits that rewarded sustainable practices implemented on the cable-stayed bridge and tunnel. Owner’s representatives will also describe how the Owner’s early commitment ensured sustainability practices were followed throughout the design, construction and operations period, the inherent compatibility of P3 projects with life cycle approaches and Envision, how collaboration among team members enhanced sustainability performance, and lessons learned.

If other East End Crossing presentations are accepted, request back-to-back presentations.

Catherine Sheane
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**Title:** Advanced Materials for Bridge Construction  

**Abstract:** Introducing DenseCRETE® heavy concrete aggregates. These aggregates, both fine and coarse, allow one to produce high-density concrete for applications such as bridge counterweights in cable stay bridges, draw bridges and suspension bridges. The achievable concrete densities are from 10% to more than 100% higher than normal concrete. The properties however, are as good or better than those achieved by regular concrete. The economics of this product make it such that it can save considerable cost over alternative heavy materials without weather related adverse deterioration. Heavy high-density concrete will also significantly reduce the necessary volume over standard concrete. Heavy High-density concrete is also an ideal material to fight scour on river beds around bridge piers while also performing at a high level against impact resistance from either ice or boats/barges.
Abstract:

Until recently the designed service life of bridge structures was a nominal and/or up to 50 years. But now the expectation for designed life of bridge structure is typically 75 to 100 years or more. This presentation will address in case study format the challenges of rehabilitating existing bridge structures to meet today's current standard of 75 to 100 years service life or longer.

Title: Prolonging the life existing bridge structures to meet today's standards of 75 to 100 years or more.

PrimaryTopic: 3D Modeling
SecondaryTopic: 3D Modeling

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Abstract:
The New Jersey Department of Transportation (NJDOT) retained Greenman-Pedersen Inc. (GPI) to design a new widened single span skewed bridge to replace the 80-year old 3-span bridge carrying NJ Route 31 over NJ Transit while maintaining thru traffic during reconstruction. The new 40 ft tall abutments were designed with spread footing of only 10 ft wide through the use of rock dowels to resist uplift due to seismic load and the use of lightweight (30 pcf) flowable concrete fill as backfill to significantly minimize lateral pressure, so as to reduce footing size, minimize rock slope excavation, and avoid impacts on rail tracks. Since cured flowable fill can stand by itself like a concrete wall, the need for temporary retaining device for backfill during staged construction is also eliminated. This concept eventually cut down overall construction cost and duration. This paper covers the abutment design, rock dowel design, selection and specification of flowable fill properties and characteristic applicable to this bridge, flowable fill pouring restriction and procedures, and abutment and flowable fill staged construction details.

Project Information
Name: NJ Route 31 Bridge over NJ Transit
Location: Glen Gardner/ Hampton Boroughs, New Jersey

Technical Merit of Presentation
Opening Date? 10/1/2014
This presentation will show how to design a tall abutment with narrow footing through the use of lightweight flowable concrete fill and rock dowels, to minimize lateral earth pressure, reduce footing size, minimize rock slope excavation, and eventually cut down construction cost and duration.

Notes: This presentation discusses how to design the 40 ft tall abutment with a 10 ft wide footing for the new NJ Route 31 bridge over NJ Transit through the use of Lightweight (30 pcf) Flowable Concrete Fill and Rock Dowels. It also discusses flowable fill pro
Prefabricated bridge columns employing grouted coupler (GC) connections can be assembled rapidly, are familiar to contractors, and have detailing emulative of cast-in-place (CIP) construction. Previous research on the seismic performance of these connections has demonstrated that the stiffened coupler region can disrupt plastic hinge formation and reduce displacement ductility. This paper presents a novel design methodology for precast columns employing grouted coupler connections. The proposed method shifts the plastic hinge location above the coupler region, which can effectively increase the plastic rotation capacity and ductility. Plastic hinge shifting was realized by using transition splicing and high-strength steel reinforcement in the connecting element (footing). The concept was validated experimentally using two 0.42-scale columns tested under slow cyclic loading and a series of uniaxial tension tests. Observations from experimental testing were subsequently used to develop an approximate method for calculating the displacement ductility of precast columns with GC connections and shifted plastic hinging. The newly developed displacement-based design procedure was then validated using a second set of bridge column tests. Initial and second round column testing indicated that good ductility can be achieved compared with previously tested GC connection details. Furthermore, the proposed displacement-based design method was found to provide a conservative estimate of column displacement ductility capacity.
Abstract:

A fracture critical bridge is defined by the Federal Highway Administration (FHWA) as a bridge with one (or more) steel member in tension whose failure would lead to partial or complete collapse of the bridge. According to the National Bridge Inventory Database of FHWA, the transportation infrastructure in the United States has more than 18,000 fracture critical bridges. Lack of load distribution redundancy in fracture critical bridges makes them vulnerable to consequences of fatigue and violation of bridge load rating. A new paradigm shifting practice in effective monitoring and condition awareness on fracture critical bridges is to use wireless SenSpot sensors. SenSpot sensors are multi-sensor devices concurrently monitoring strain, temperature, and inclination on structural members of highway bridges. To address the specific needs of fracture critical bridges, SenSpot sensors are attached to structural members with tension. Examples include truss members, girders, floor beams, stringers, gusset plates, etc. Analysis of the data provides accurate and highly reliable method to detect metal fatigue, change in elasticity, and change in characteristics of the fracture critical members. The presentation will share the success stories in existing projects where SenSpot sensors are used to monitor fracture critical bridges, namely, Gold Star Memorial Bridge (I-95 over the Thomas River, Connecticut), Robert Norris Bridge (VA-3 over Rappahannock River, Virginia), and I-70 over Patapsco River in Maryland.

Notes:

This presentation discusses the use of SenSpot technology as a breakthrough method for monitoring fracture critical bridges. SenSpot sensors have been developed by Resensys LLC through collaborative work with the University of Maryland. The development of SenSpot technology was supported by the Small Business Innovation Research (SBIR) program sponsored by the U.S. Department of Transportation. SenSpot sensors are currently being used in various projects across the United States. The projects include bridge monitoring, structural health monitoring, and condition assessment. The presentation will discuss the benefits of using SenSpot technology in bridge monitoring and highlight the success stories from existing projects.
Abstract:

Load testing of deep foundations is commonly limited to verification. The design and construction industry generally views the monetary cost and time of performing design-phase load testing as too expensive. Similarly, it views the costs of altering the design based on load tests at the start of construction as too high. Large or complex projects tend to be the exceptions. Using load tests to guide foundation design, a project can realize money and time savings. Two design-build, transportation projects in the Minneapolis-St. Paul metropolitan area demonstrate the potential for monetary and time savings from load testing.

The Interstate 35W Bridge in downtown Minneapolis was a momentous collapse. Equally impressive was the design and construction of a replacement bridge supported primarily on drilled shafts. The shaft design included an axial-compressive static, load-test shaft to validate design parameters and construction methods. The test results allowed a significant reduction in shaft length with a direct cost and time savings.

Representative of a more-common transportation project, the TH 610 Completion project created a new, trunk highway alignment with multiple bridges and retaining walls, as well as an embankment load-transfer platform. Driven, closed-end, steel-pipe piles support most structures. The project utilized high-strain dynamic load testing during initial drive and restrikes of test piles to refine design parameters and establish driving criteria. The test program and the adjustments to the pile design resulted in a costs savings of approximately $98,000 in pile material, plus reducing the duration of pile driving.

Notes:

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KS Associates was hired by the Ohio Department of Transportation to inspect, load rate, and develop rehabilitation plans for a 314 foot long historic concrete deck arch bridge with a main arch span of 162'-9". The bridge was built in 1933, and is in very good condition except for areas adjacent to the expansion joints.

As part of the load rating, KS was tasked to investigate what affect eliminating the expansion joints would have on the structure. KS developed two 3D finite element models, a shell model and a frame section model. The shell model was developed primarily to determine the effects of thermal forces on the bridge and to determine the amount of fixity of the connections to use in the frame section model. The frame section model was used to perform the load rating.

We will present how the use of a 3D model was essential in determining the capacity of the structure due to the floor beam interaction with the columns to act as frames that provide lateral support to the twin arch sections. Additionally, we will show the results of our investigation into the thermal effects on the structures and why these expansion joint are so important on arch bridges.

Finally, we will expand on other advantages of developing the 3D Model which allowed us to print a scale model of the bridge with a 3D Printer, and to export the 3D model into Google Earth for easy viewing for the public and the client.

Notes: We will bring a 3D printed Scale Model of the Arch Bridge to the presentation.

The primary author, Michael Malloy has previously present at the IBC in 2009 (IBC 09-11) and understands the commitment and the requirements.

We have load rated hundreds

Co-Author's: Robert Pfingsten KS Associates, Inc 260 Burns Road Elyria Ohio 44035 440 365 4730 pfingstenr@ksassociates.com
Abstract:

BIM/BrIM is a process to plan, design, construct and manage infrastructure that involves creating and using intelligent 3D models. The process initiates from the earliest stages of a project and continues through conceptual design, detailed design, fabrication and construction planning, and construction.

The proper BIM/BrIM implementation strategy that integrates people, technology and process correctly can enhance the productivity and efficiency of the design, construction and maintenance programs. A different mindset will gradually grow inside organizations and teams using BIM/BrIM for their projects. The policies, organizational structures, design and means and methods, resources are needed to be closely examined in order to ensure the successful implementation of BIM/BrIM. Also, the appropriate technology is needed to be in place to move to BIM/BrIM.

This paper will provide insight to projects that our team at EnTech Engineering provided BIM/BrIM services for and will study the BIM/BrIM implementation level of maturity.

Notes:

The presentation will include several case studies to investigate various BIM/BrIM implementation strategies, their advantages and disadvantages. EnTech will demonstrate the findings and provide a guideline for future implementation.

Co-Author's

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Abstract:

Along Route 60 adjacent to the Chesapeake Bay, construction began on Virginia Beach's Lesner Bridge Replacement Project in 2014. Crossing the Lynnhaven Inlet the bridges are an historical part of the main thoroughfare along the scenic north shore of Virginia Beach.

Funded by the Virginia Department of Transportation (VDOT) and the Federal Highway Administration (FHWA), this Locally Administered Project (LAP) consists of twin 1,575' long pre-cast segmental bridges. Because these bridges have been uniquely designed to use both the span-by-span and cantilever erection methods, the Prime Contractor (McLean Contracting) is utilizing a custom retro-fitted overhead lifting truss to perform the segment erection for this project. The 53' wide segments, being cast off site, will accommodate two lanes of traffic, with sidewalks and shoulders on each side.

Since the bridges are located within a harsh marine environment, a continuing effort to advance quality standards and innovation in the industry was employed, and high quality materials such as self-consolidating concrete, low-permeability concrete, and corrosion resistant reinforcing steel are being used. These specialized materials will contribute to the bridges sustainable 100-year design life.

Title: Advanced Materials & Complex Construction Methods on the Lesner Bridge Replacement Project

Primary Topic: Segmental Concrete Bridges
Secondary Topic: Construction

Project Information

Name: Lesner Bridge Project
Location: Virginia Beach
Opening Date: 11/16/2017

Technical Merit of Presentation

This presentation will show the IBC attendees the complex construction processes and advanced materials being incorporated into this pre-cast concrete segmental bridge project. Some of these processes include drilled shaft construction using SCC in a protected marine environment, match cast pre-cast concrete segments, post-tensioning and high performance grouting.

Notes:

Co-Author's
Abstract:

In the 1850’s when railroads were expanding rapidly throughout the United States, timber and masonry were the materials of choice for most bridges due to their proven strength characteristics and prevalent availability close to the bridge sites. For the West Chester & Philadelphia Railroad, their line from Philadelphia to West Chester, Pennsylvania included four large masonry and timber bridges over the Cobbs, Darby, Crum and Ridley Creeks. Under the successor to WC&P, the Philadelphia, Wilmington & Baltimore Railroad, which ultimately was a railroad controlled by the Pennsylvania Railroad, the timber bridges were replaced with a combination of wrought iron and soft steel viaducts using many of the same masonry piers and abutments. These bridges were built in the 1890’s with major extensions constructed at Cobbs and Darby Creeks by the end of the century. It is these bridge structures that still exist today at Cobbs, Darby and Ridley Creeks with the Crum Creek Bridge being replaced with a new structure during the summer of 2016.

The Southeastern Pennsylvania Transportation Authority (SEPTA) contracted with Gannett Fleming, Inc. to complete the following tasks for the Cobbs, Darby and Ridley Creek Bridges.

- Review most recent major repairs performed in the 1980’s
- Review internal SEPTA inspection results
- Perform track and ground level inspections
- Design repairs to foundations, piers, abutments, track level retaining walls and steel superstructure
- Determine needs for complete repainting of the bridges
- Document work to minimize track operation interruptions

The work was completed over two and half years in two contracts.

Notes: This presentation will include before and after photographs, historical documentation and construction methodology discussions.

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**Abstract:**

This discussion of the design, integration and comparison of modeled and measured test results from optically-based bridge monitoring technology provides knowledge that will help the practitioner make informed decisions regarding monitoring system configurations. The ultimate beneficiary will be the public through improved safety and longevity of our vital transportation infrastructure.

This Paper is focused on first cable-supported Indian River Inlet Bridge (IRIB) in the United States to have an extensive SHM system installed internally during initial construction. With the exception of a few sensors, the SHM system is an all fiber-optic based design. It consists of more than 120 sensors of different types distributed throughout the bridge. Data from the system is being integrated into the bridge maintenance and inspection records for the bridge and will facilitate DelDOT’s ability to maintain and operate the bridge throughout its life. Knowledge of the structural health of bridges is vital in order to identify appropriate maintenance needed to sustain their performance and ultimately improve their safety and longevity; this applies to both new and existing bridges. The Advanced Technologies Group of Cleveland Electric Laboratories (CEL) has designed and installed structural monitoring systems in multiple major bridge structures of different designs. This prompting the need to develop a unique way of gathering data from software developed by (CEL) that greatly enhances the type of analyzes beyond today's standard software's. From these systems provide timely and valuable insights into bridge health, and CEL has gained knowledge and experience in the configuration of sensing systems necessary for Long-Term Bridge Performance (LTBP) monitoring. CEL systems are optically based and utilize fiber Bragg grating (FBG) sensors which require no electrical power, are passive, rugged, immune to lightning, and have reliability typically exceeding that of legacy electrically-based sensors. The opportunity to share this information to understand needs for (LTBP).

**Notes:**

This Paper is focused on first cable-supported Indian River Inlet Bridge (IRIB) in the United States to have an extensive SHM system installed internally during initial construction.

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The Edmonton Valley Line Stage 1, Light Rail Transit Project is located in Edmonton, Alberta, Canada. The scope of the works consists of a low-floor urban transit line that connects the Southeast of the city to the downtown core. The $1.8bn project consist of a 13km line that includes a cable stay river bridge, twin bore tunnel, an operations and maintenance facility, a Davies station complex, Churchill Connector, 11 stops, park and ride facilities and 1.5km of elevated guideway structure.

TransEd Partners has been selected by the City of Edmonton to finance, design, supply vehicles, build, operate, and maintain the Project which will be delivered using a Public-Private Partnership (P3) procurement model. Arup Canada Inc. is lead consultant for civil and infrastructure design.

This paper summarizes the methodology used to determine the rail-structure interaction effects for the cable-supported Tawatina Bridge and the South River Valley Guideway. The conclusions and recommendations of this paper give data on the following:

- Rail stresses;
- Rail gap size;
- Required rail clip stiffness properties;
- Longitudinal rail deflections; and
- Rail articulation.

Unique features of this design include the use of a rail anchor to mitigate rail deflections and the elimination of rail expansion joints along the 470 meter length of elevated structure.
This paper will highlight the design and construction challenges of the cut and cover railroad tunnel in highly urban setting while maintaining railroad operation. The new tunnel consists of a twin cell tunnel except for a short distance at the west end of the project where the two cells merge in one box. On the east end the two cells splits to form a fork and clear the piers of the newly constructed 11th Street Bridges.

The new tunnel which is currently under construction is being built in 2 phases. Phase 1 will require building the M1 track tunnel south of the existing while maintain train operation in the existing tunnel. Phase 2 of the project will require shifting train operation in the newly constructed M1 track, demolition of the existing tunnel and construction of the new M2 track tunnel. A short section of approximately 350 ft long of the existing tunnel at its westerly end was demolished in phase 1 to allow construction of the M1 track structure.

The presence of existing infrastructure facilities above and underground and within close proximity of the tunnel posed significant design and construction challenges. This includes the existing I-695 and 11th Street Bridges and retaining walls, existing streets and associated underground utilities, the 14 ft diameter Tiber Creek sewer, and other infrastructures. In order to mitigate concerns with potential settlements and its impact on the existing tunnel and adjacent structures a robust support of excavation system was required including a secant pile wall adjacent to and south of the existing tunnel.

The Virginia Avenue Tunnel (VAT) is located in Southeast Washington, D.C. between 2nd Street SE and east of 11th Street, SE underneath Virginia Avenue, aligns parallel to I-695. The existing tunnel is a stone and brick masonry railroad tunnel approximatel
Abstract:
The Broadway Bridge in Little Rock, Arkansas is one of the most heavily traveled in the area, as it leads directly into downtown Little Rock. First opened in 1923, the bridge was deemed structurally deficient in 2011. HNTB is working as a sub-consultant to Garver Engineering for the Arkansas State Highway and Transportation Department on a $98 million removal and replacement of the Broadway Bridge in Little Rock.

HNTB developed proposed several bridge types, from simple girder spans to cable-stay bridges. Since the existing bridge is an arch bridge, the final selected design consists of two network tied-arches over the Arkansas River. 3D visualization was the key in illustrating the various bridge concepts during the project pursuit and preliminary stage and the final design concept that was featured for the public meeting and media outreach.

Bridge aesthetics including the color of the steel arches, aesthetic lighting, and appurtenances such as memorial features commemorating the military veterans and the 50 states of the United States were studied utilizing the 3D modeling and visualization. In addition, 3D models of bridge details were used as part of the Bridge Information Modeling to confirm clearances and conflicts within the design.

The new Broadway Bridge is currently under construction, with the two network tied arches and tied girders being built on barges ready to be floated into place utilizing Accelerated Bridge Construction, with completion scheduled for 2017.

Notes:

Co-Author's
Abstract:

It is well-known that the vertical peak ground accelerations (PGA) have surpassed horizontal PGA during the recent major earthquakes, i.e. that at Sandei of Japan in 2011 and that at Chile in 2009. By revisiting the USGS and California GS’s records for Northridge earthquake of 1994; it can be found that the vertical ground motion was also significantly high, which, according to after-quake reconnaissance[1], did play a role for those bridges failed, though it is mandated to have adequate capacity to sustain vertical PGA in current bridge’s design.

This project develops a method to improve a bridge’s integrity including the capacity to sustain strong vertical vibration, in conjunction with suggested calculation formula and a class of seismic-proof connection devices [2] for the joints between a bridge’s superstructure and pier or that between pier and footing with the robustness similar to cast-in-place. Additionally, it also enables accelerated bridge’s construction (ABC).

This article introduces WPE-based analytic solutions for the orthotropic deck systems with open or closed ribs, as well as a procedure that hybrids structural theoretical solution with finite element routine, so as to provide a tool for design computation and fatigue evaluation with engineering-acceptable accuracy. Application and numerical examples will be presented.

Title: Wolchuk-Pelikan-Esslinger Method for Orthotropic Deck Design

Technical Merit of Presentation

1) Provide a method to repair and reinforce the orthotropic deck systems with fatigue cracks
2) Assist new orthotropic deck's design without extremely thick deck-plate thickness

Abstract:

Application and numerical examples will be presented.
Abstract: The I35W Collapse is the largest bridge accident in past 50 years. The NTSB investigation has found that the U10 gusset plate of the bridge was undersized; the plate's failure triggered the fall of the entire structure. Because the bridge was opened to service at 1967, the questions to be answered are (1) how could it have survived 40 years? (2) what is the key in all the lessons learned of this incident, so as to assure the safety for other bridges with the similar structure and age.

The following facts have been examined quantitatively: (1) the past records indicated the average traffic flow over the bridge had been stayed on the similar level for years before the collapse; (2) at the day of the incident, there was about 360 kips of construction loads over the main span's deck of the bridge, plus 36 personal cars, whereas there were 2 lanes closed to traffic in the 8 lanes of the bridge; (3) during a road test at 2000, 9 dump trucks in the weight of about 450kips had been put on the bridge deck. Therefore, the most-like reason that caused the U10 gusset plate's failure is some timely-related factors. After carefully studied the NTSB's investigation documents, obvious fatigue cracks have been found in the welded joints between the gusset plate and connected trusses; among them an impenetrate weld defect-induced fatigue crack has the length more than 10 inches. On the other hand, although the bridge's owner did have conducted multiple evaluations to assess the risks of fatigue failure, the last report, almost finished when the collapse occurred, concluded the danger of fatigue failure is remote. Currently national-wide there are about 220000 steel structured bridges in services, more than half of them were built 50 years ago. Fatigue damage can be a serious threat for these bridges' safety.
The Lucille Jefferson Memorial Bridge in Smithland, Kentucky carries US 60 traffic over the Cumberland River. The existing 1814' long bridge includes a 501' truss span that clears the main navigation channel. The structure has been deemed functionally obsolete due to narrow lanes and shoulders. It also has long been a challenge for marine traffic with a long history of barge impacts and “touches” to piers.

This section of the Cumberland River accommodates barge traffic as the US 60 roadway alignment crosses in a tight S-bend portion of the river. As a result navigation concerns were a major factor in the evaluation of replacement options. As part of the bridge type study, an innovative approach was used to address the needs of the navigation industry, facilitate the new bridge span arrangement and type selection, and expedite the Coast Guard approval process. Realistic 3-D virtual environment modeling and navigation simulation was utilized to evaluate combinations of proposed pier locations and bridge alignments.

Simulations were performed by experienced barge captains who provided invaluable feedback on the navigational impacts of different configurations. This facilitated quick decision-making regarding the necessary length of the navigation span. This type of input and feedback from the navigation industry would not have been available utilizing the traditional project development process. The result saved significant project re-design time and cost that would have resulted otherwise. The resulting bridge features a 700’ navigation span that will facilitate both construction and barge traffic in the future.

Presentation will include videos (no sound) of simulation modeling.
Title: Construction of Ecuador's First Launched Steel Girder Bridge

Abstract:
The Los Pájaros Bridge is the first project in Ecuador to utilize the incremental launching method for construction. The use of steel bridges has only recently begun in Ecuador and this project represents a significant advance in bridge construction technology in the country. This unique approach to steel bridge construction is expected to result in additional steel bridges being utilized throughout Ecuador.

The bridge spans the Rio Monjas just north of Quito, Ecuador and consists of three 65 m (213 ft) steel girder spans. The bridge incorporates two parallel superstructures, one utilizing four steel girders and the other five girders to accommodate a bike/ped shared-use path. Due to the mountainous local geography and congested road network, girder sections were limited to 12 m (39 ft) in length and assembled on site using field welded splices.

The bridge was originally designed using three simple spans; however, a value engineering approach by the contractor team converted the bridge to continuous spans and allowed the use of launching for construction. Due to the steep terrain and limited site access, launching was proven to be a safer, faster and more economical approach to bridge construction at this location.

A pair of two-column piers rise 33 m (108 ft) above the concrete footings and are supported on 17 m (56 ft) long drilled shafts constructed using permanent steel casings. Seismic conditions at the site were carefully considered in the design – an especially fortunate decision in light of the April 2016 earthquakes and ongoing aftershocks.

Notes: This bridge is the first project in Ecuador to utilize the incremental launching method for construction. Steel bridges have only recently been used in Ecuador and this project represents a significant advance in bridge construction in the country.

Project Information
Name: Los Pájaros Bridge (The Bridge of Birds)
Location: Quito, Ecuador
Opening Date: 11/30/2016

Technical Merit of Presentation

Attendees will learn how the incremental launching method has been successfully used to construct the first steel bridge of its kind in Ecuador. The presentation will include designer and contractor perspectives and will highlight how this approach will advance bridge construction in this challenging construction environment.

Abstract:

The Los Pájaros Bridge is the first project in Ecuador to utilize the incremental launching method for construction. The use of steel bridges has only recently begun in Ecuador and this project represents a significant advance in bridge construction technology in the country. This unique approach to steel bridge construction is expected to result in additional steel bridges being utilized throughout Ecuador.

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Abstract:
One of the last major markets in the United States where ACIP piles are not routinely considered is Federal and State transportation projects, particularly in the area of bridge column, abutment and bent support. While FHWA GEC#8 provides an excellent framework for Contractor’s to possibly provide performance-specification based alternates for certain projects, feedback from State DOT’s indicates continued uncertainty or a lack of understanding on their part of the monitoring methods available to ensure quality and repeatability of ACIP installation and subsequent performance.

Performed in conjunction with the Florida DOT, the purpose of this project was to demonstrate the fully monitored installation of instrumented ACIP piles, including Automated Monitoring Equipment, post-installation Thermal Integrity Profiling, compression, tension and lateral load testing (including monitoring of strain gages embedded along the compression pile shaft), and post-testing extraction of an installed pile for visual inspection. Seven test piles were installed, two each for compression testing, tension testing, and lateral testing along with one for extraction and visual inspection. This paper includes a summary of the results of the program.

Notes: The project was noted at the end of the author’s presentation at the 2016 IBC.
Abstract:
One of the primary degradation factors that contribute to compromising the structural integrity of bridges involves leaking joints, which allow water, debris and deicing corrosive materials to penetrate through to the substructure. Poured silicone sealant is one of the most popular choices for sealing small movement expansion joints due to its cost efficiency, ability to accommodate imperfections in the header, and ease of installation. Currently, poured silicone sealants must be replaced every 2-3 years in Connecticut mainly due to delamination of the sealant from the substrate. To address this issue, a novel silicone foam sealant has been developed, which exhibits a reduced modulus of elasticity, minimizing stresses at the interface between the sealant and the header. This paper describes the installation of the foam sealant on three active bridges in Connecticut. The bridges were selected according to varying traffic levels (6,100 – 53,000 vehicles per day), a range of joint gaps (1 - 4.5 inches), various spans (and therefore joint gap movements) and two different types of headers (concrete and polymer concrete). To allow for in-service comparison, both sealants were used in the same expansion joint and placed accordingly to prevent biased conclusions. After installation of the sealant, all expansion joints were extensively monitored for gap size, defects of the joint, debris accumulation on the road, and environmental conditions. Although the monitoring phase is still on-going, the new foam sealant is observed to perform as good as, if not better than the commercial available sealant.
The presentation will go over the successful use of a 3D modeling program to plan and execute a critical lift on the Moses Wheeler Bridge project located in Connecticut. The critical lift that will be examined on the presentation consisted of four drop-in girders. 3D modeling was used to examine the placement of these four girders by two cranes positioned on each side of the river channel. During the planning stage, a virtual construction site was created in a commercial 3D modeling program utilizing contract plans and actual as-built survey data. All 4 drop-in girders were erected successfully and ahead of schedule.

Notes:
I intend to show portions of the 3D modeling drawings used during the planning stages and also pictures and videos taken during the steel erection work. Furthermore, the above mentioned topic was published as a paper by the American Society of Civil Engineers, ASCE. ADMIN NOTE: Cori,
The paper was written by me and already published in the ASCE structural periodicals. The paper has not been presented to a conference, but as previously mentioned it was published by ASCE.
Since it was an interesting problem that we were able to solve on that particular job site, and if there is interest by IBC to be presented at the conference, I can write a separate presentation / paper just for your conference.
Abstract:
Recently Pennoni and Advitam implemented software for use by the Washington D.C. Department of Transportation (DDOT) to manage their inventory of culverts and assist with storm water management. The project delivered a new culvert management software in 2014, and included work to input an updated inventory and revised inspection manual. The new Storm Water management Information System, or SWIM, is now being used by inspection and management teams. In addition to assisting with inspections, SWIM also enables teams to create and track repair items and activities.

In less than one year of operation, the SWIM project was recognized by DDOT’s Infrastructure Project Management Administration. It was presented with their 2014 Project Development & Environment Award for “Excellence in Innovation.”

This presentation will cover topics including the need for a new system, challenges and successes faced during the project, as well as the current use and future potential for DDOT.

Notes:

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