AB CONNECTIONS

Spring 2016—Issue #1003

THE BIG PICTURE:

MAKING HISTORY OVERSEAS

Cover: Queensferry Crossing | Edinburgh Scotland
Photo Credit: Transport Scotland

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AMERICAN BRIDGE CONNECTIONS
Spring 2016—Issue #1003

American Bridge

THE BIG PICTURE:

MAKING HISTORY OVERSEAS

Location: Edinburgh, Scotland
Owner: Transport Scotland

All photos courtesy of Transport Scotland

It has been almost five years since the design and construction process began in Edinburgh, Scotland. And with around a year left to go, the Queensferry Crossing is on track to be completed by the Spring of 2017.

Forth Crossing Bridge Constructors (FCBC), a joint venture of Hochtief Solutions, American Bridge International, DRAGADOS, and Morrison Construction, has been hard at work designing and building the Queensferry Crossing, a cable-stayed bridge over the Firth of Forth near Edinburgh, Scotland. This scheme is Scotland's largest transportation infrastructure project in a generation and the largest bridge program underway in Europe. It will carry the M90 motorway across the Firth of Forth, and will replace the main traffic-carrying elements of the neighboring Forth Road Bridge Suspension Span, opened in 1964. Two ocean navigation channels cut through the project site, the south used primarily by oil tankers and other commercial navigation and the north by cruise liners, ferries, and naval ships.

The new bridge is 2,638 meters from abutment to abutment, with the overall length of the cable-stayed portion at 2,090 meters, becoming the world's longest three tower, cable-stayed bridge. In all, including the north and south approach viaducts, the bridge has 14 spans, three concrete towers in the center of the transverse cross section, two planes of stay cables that anchor in the center of the structure, and a composite steel tub/concrete deck superstructure.

As a project of such significance, there are many components that make up the larger project—this is no simple feat. There are approach viaducts, network connections, towers, and of course, the cable-stayed bridge portion. A large, complex, and unique project for sure, but nothing that the FCBC team can't handle.

The south road networks includes a 2.5 km new divided approach highway, the new Queensferry Gyratory (top left), a new bridge carrying the B800 over the M90 (bottom right). Utility work included protection of a 76cm BP Oil pipeline, which the new alignment crosses three times.

NETWORK CONNECTIONS

Without the network connections, the Queensferry Crossing would be nothing but a pretty picture. Although the sight of this one-of-a-kind civil engineering project is an added bonus, the real reason for this masterpiece is to get people and commercial traffic across the Firth of Forth during their daily activities. Therefore the network connections are one of the most important pieces of the puzzle, connecting the existing roads on either side of the bridge. Major improvements to the trunk road network in the east of Scotland are included to make the Queensferry Crossing functional. With a total of 19.7km of roads connecting to the bridge being significantly upgraded and about 4km of completely new connecting roads being built, this $158 million portion of the overall contract could stand as a project all on its own.

Substitution of embankments for structures in the north approach road networks is among many of the innovations that FCBC formulated to be the low bidder for the Queensferry Crossing project.

The material used for these embankments is made up of a combination of Spent Oil Shale (graded Class 1A material) which is imported from a nearby bing and created the waste, and site-won Class 1 crushed/excavated rock material (extracted from Whinny Hill blasting and excavation) and Class 2 Boulder Clay excavated from the earthworks operation at the north end of the Project.

The overall Ferrytoll embankment (including all slip roads and transport links), made of the material described above, is approximately 552,000 cubic meters (over 1 million tonnes). The B981 embankment through St. Margaret's Marsh is built on a grid of Controlled Modulus Columns (CMC) piles to stabilize the fill through the marsh. The fill used in this embankment is approximately 110,000 cubic meters of the same material.

Strong progress was made on the network connections in 2015. By December the new 2.5km south approach M90 mainline earthworks and roadway base preparation was complete, and is now awaiting warmer weather for paving operations. The new B800 bridge over the A90 was fully opened to traffic in both directions in July, and the Queensferry Gyratory, a type of roundabout, was also marked in the "completed" column.

On the north side, the new Ferrytoll Viaduct was completed in March and the reinforced concrete deck on which the final road surface will sit is currently in progress. North of the viaduct, work is progressing on the main structures which will form the new, re-located Ferrytoll Gyratory. On nearby Castlandhill Road, the new earth retaining wall and embankment that supports the new M90 northbound merge slip road, which opened to traffic in August, is complete. The new B981/Ferrytoll Road/King Malcolm Drive junction was also completed in September.

The north roadway networks include significant sequencing to maintain traffic. The work includes the Ferrytoll embankment and viaduct on the M90 mainline, a relocated Ferrytoll Road (right of the treatment plant), and a completely reconstructed and extensively phased Ferrytoll Gyratory. Extensive utility work included trunk distribution relocations for water, combined sewer, and electrical distribution (overhead and underground).

The 525m Approach Viaduct South (AVS) was incrementally launched in 12 phases.

THE APPROACH VIADUCTS

There are two Approach Viaducts—the North (AVN) and the South (AVS). While launching methods are being utilized for both approaches, they are very different owing to unique conditions on each side.

The AVS comprises two parallel steel tubs with composite, cast in place concrete decks made up of 19 segments of varying lengths. The overall length is about 545 meters. The AVS is supported by the south abutment and six piers (S8–S3), and will be joined with the cable-stayed bridge after Pier S3.

The AVS was incrementally launched in 12 stages onto the "V" shaped piers. The steel tub girders were fabricated in the UK, trucked to the site and welded with longitudinal and transverse welds on the launch pad. The segments were pulled using a strand jack system. A king post stay system on each tub controlled deflection. The concrete deck is being poured in-situ after the launching was completed in 2015.

The incremental AVS launch allowed FCBC to minimize disruption to the steep bank, residential community, historic barracks, and environmentally sensitive shoreline below the viaduct, and took advantage of the approach roadway by utilizing it as a launching site.

The AVN is made up of two different cross section types: parallel twin composite decks, and a single composite deck with 12 single deck segments and 8 twin deck segments. This will be supported on the north abutment and two piers, N2 and N1. The overall length of this approach viaduct is 221 meters.

Launching was chosen for the AVN due to the presence of a steep bank at the shoreline, low water depths prohibiting barge access, and to avoid dredging at the north end (this shoreline is a Ramsar site, a Wetland of International Importance). The AVN launch is complicated by the necessity of pushing both the single and twin segments. Therefore, the FCBC team assembled all of the single segments that will eventually be part of the cable-supported structure on the launch pad, along with the eight twin sections that are part of the north viaduct. Since the single box sections are 40m wide, the segments could not be delivered to the launch pad fully assembled. FCBC set up a site fabrication facility on the launch pad, where truckable

subcomponents were received and assembled. The 221 meter north approach viaduct was preassembled on land and launched as a single unit over each of the two north piers.

A king post system similar to the one used in the AVS was utilized on the AVN with significantly enhanced cabling and jacking capability, controlling deflection on the much heavier assembly. The king post also eliminated the need for extensive permanent reinforcement of the tub girder assemblies, using a temporary works to resist a temporary load condition.

As the AVN launch advances towards Pier N2, the king post ensures that the nose is high enough to clear the supports at the top of the pier. As the launch approaches Pier N1, the support in the north abutment is transferred to ramp walls. Skid shoes then travel down the ramp walls, rotating the deck two meters about the launch supports at Pier N2 like a seesaw. At that point, the deck is at its final slope, and the nose can pass over Pier N1. Once the deck has touched down on Pier N1, the king post cables can be de-tensioned and the last few meters of the launch completed. Following completion of the launch, the concrete deck is cast in place. The south viaduct launch is now complete and the north viaduct launch is scheduled for completion in March.

The 71m Approach Viaduct North (AVN; the twin box section) and a portion of the sidespan north of the cable-stayed bridge were launched in a 232.7m single unit, with the aid of a kingpost to control deflection.

The three concrete towers are between 207-210m tall, and cast with jump forms. An all-weather “bird cage” allowed work to proceed in Scotland’s famous changeable weather.

TOWERS

Despite the furious winds for which the exposed Forth estuary is known, the three highest bridge towers in the UK were brought to full altitude by the end of 2015, a huge milestone for the Queensferry Crossing project team.

The reinforced concrete towers start at bedrock nearly 40 meters below the water. The middle tower reaches 210 meters above sea level into the sky while the flanking towers on either side are each 207 meters, making the Queensferry Crossing the UK'S tallest bridge. The towers are roughly rectangular in shape with the east and west sides curved and the north and south sides (where cable anchorages are located) inclined. They were built in 4 meter sections using climbing formworks, or jumpforms, with a total of 54 lifts per tower. Each of the 54 tower lifts had a slightly different profile, as the hollow towers taper gracefully from 16 by 14 meters at the base to just 5 by 7.5 meters at the top.

The towers were constructed with the aid of static mounted tower cranes, the tallest in the UK at a maximum height of 235 meters above sea level. Once all 54 pours were complete, a 6 by 4 meter precast concrete slab, complete with entry hatch and parapet walls, was fitted across the top of each hollow structure, marking the completion of the tower construction program.

The towers are integrated onto structural foundations through heavy vertical reinforcement and embedded into the massive 25,000m^3 concrete bases formed by using 1,219 tonnes steel caissons sunk to the Forth's seabed (see First Quarter 2013 Connections Issue for caisson details). For the tower construction, a total of 25,700m^3 of concrete, 7,350 tonnes of rebar, and 38,200 rebar couplers were used. Nearly all of the high quality concrete on the entire project was produced in a single FCBC owned and operated batch plant on-site—a total of around 200,000m^3.

Down at road deck level, work is now underway to insert tensioned steel strands inside the already poured, reinforced concrete deck slabs in an operation called post-tensioning, which increases the strength of the final road deck, making it fit to carry the traffic load in the decades ahead.

Close-up of the tower jump form system and the tower crane tie-ins. Most concrete was pumped.

Cable-stayed bridge segments are being erected with special, narrow gantry cranes designed to take advantage of the central stay webs, thus avoiding reinforcement of the deck segments.

CABLE-STAYED BRIDGE (CSB)

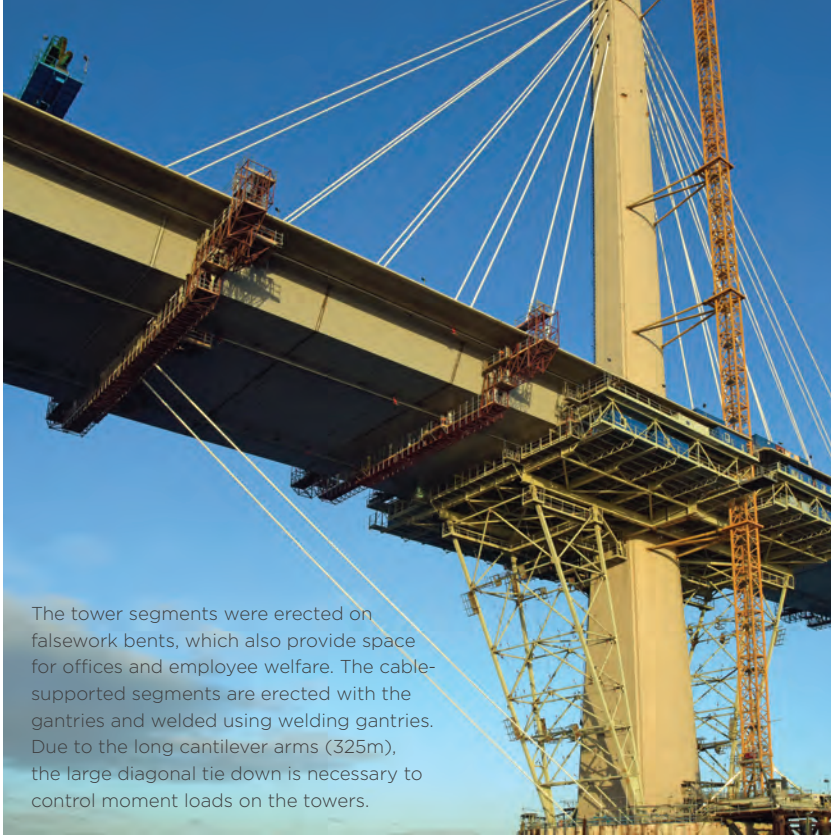
What would the Queensferry Crossing be without the iconic and graceful cable-stayed bridge portion? Arguably the most distinctive and prominent part of the entire project, it will be the image captured by locals and visitors alike. Over the past few years, residents have watched the three main towers grow to full height. As progress is made in erecting deck sections outwards from the three towers, the community is now able to visualize the cable-supported superstructure's graceful final shape.

Of the 2,638 meters of the full main crossing, 2,090 meters make up the cable-stayed portion, including twin main spans of 650 meters supported by the three main towers. It is also comprised of a multi-cell steel box tub girder with a composite reinforced and post-tensioned concrete deck, and a parallel strand system is utilized to anchor the deck girders to the towers.

The process for constructing a cable-stayed bridge is not simple, despite the elegant minimalism of the final structure. A countless number of steps make up a bridge of this caliber. The first work for the CSB team involved erecting temporary falsework at each tower to accept four starter segments. These starter segments have heavier steel and concrete so they were erected with the temporary falsework in order for their concrete decks to be cast in-situ. For the typical segments, the concrete deck is cast onto the steel tub girders at a site casting yard in the nearby Rosyth Docks, fitted with mechanical, electrical, and inspection walkway components, and then rolled onto ballasted delivery barges. The two delivery barges, which can accommodate three completed deck segments, are towed approximately 3 kilometers from the precast yard to the bridge site. The barges are anchored into position below the specially-designed erection travelers. Utilizing two strand jacks, the erection travelers lift the on average 750 tonnes segments to elevation roughly 60 meters above the water. Once the segments reach road elevation, the global geometry is established and fixed, allowing the skilled welders to begin the work of joining the segments. As soon as the tub girder's top flange welds have been inspected for defects and approved, the in-situ concrete stitch can be formed and poured. The stay cable pipes can be lifted simultaneous to the stitch pour, with the delicate engineering process of strand installation following. Each installation must take into consideration the amount of weld laid down and the strength of the

concrete stitch. When strand installation is complete and the stay cables fully tensioned, the erection traveler can release the load of the segment onto the newly erected stay cables and self-propel itself forward to be ready for the next segment lift. The segments must be erected in a balanced cantilever fashion on each tower, never being more than one segment ahead on either side.

At the end of January 2016, 40 of the 110 deck segments have been erected. The 12 starter segments at the towers were erected in the fall of 2014 and the 110 typical deck segments started going up in September 2015 with work ongoing.



The tower segments were erected on falsework bents, which also provide space for offices and employee welfare. The cable-supported segments are erected with the gantries and welded using welding gantries. Due to the long cantilever arms (325m), the large diagonal tie down is necessary to control moment loads on the towers.

Throughout the construction of the CSB, the FCBC team has battled the wet, windy, and cold weather conditions in the Firth of Forth. When designing the temporary works and permanent works, FCBC researched past data on seasonal wind, rain, and fog to approximate what conditions could be expected. This approach has paid off, as the past has been a good predictor of on-site conditions. FCBC has designated a maximum wind speed for each work task, and operations are progressively suspended and re-started as the frequent Atlantic storms pass through the region.

At the point of maximum cantilever, the central tower fans will be the world's longest balanced cantilevered construction. This achievement is aided by a system of temporary tie down cables beneath the superstructure. The tie down system is used to minimize the massive out of balance moment effects the construction stages would place on the towers without them. They pull one side of the tower fan down and effectively preload a moment into the towers such that when lifting the critical out-of-balance segments, the maximum moment experienced is halved. The temporary tie downs are comprised of four stay cables pipes and strands similar to the permanent stays system that are part of the permanent bridge structure. There are four tie down cables at each tower with their lower anchorages located behind a mass concrete block anchorage chamber that was cast into the bottom of the towers during their initial lifts. The tie downs penetrate the tower walls and run up through the soffit of the deck segments approximately 90 and 106 meters from the tower centerline where they anchor into temporary anchor beams fabricated into the permanent segments. After the flanking tower fans are closed to their anchor piers and the central tower fan is fully erected, the temporary tie downs are disengaged. When the central tower is at full cantilever it is fully balanced and the tie downs are no longer required. When the temporary tie downs are removed, the holes in the segment soffits are closed with welded plate and the tower penetrations, along with the anchor chamber, are filled with concrete.

With around a year left to go, and 10 years in the making—from the inception of the idea to replace the bridge—everyone is getting ready for the Queensferry Crossing to be opened and in full use. As the existing Forth Road Bridge is not dependable in high-wind conditions (when it frequently operates at reduced speed and capacity) and sustains the inevitable impacts of age and corrosion, the Queensferry Crossing is much needed and anxiously awaited in Scotland. Many milestones have been achieved, and the four components—the Network Connections, the Towers, the Approach Viaducts, and the Cable-Stayed Bridge—are well on their way to forming a functional and aesthetically pleasing addition to the two other world famous, iconic bridges crossing the Firth of Forth in the Queensferry area.

LANNY MILLER

SENIOR PROJECT MANAGER

What is your background in? How did you become interested in engineering and construction?

I have a Civil Engineering Degree from Kansas State University. I spent the first eight years of my career as a structural engineer with a large firm in a cubicle doing calculations all day and realized that was not something I wanted to do forever. Growing up on a dairy farm, I enjoyed being outside and actually seeing something getting done, so I moved onto the heavy highway construction work.

What brought you to American Bridge? What was your impression of the company? Has it changed now that you are on the "inside"?

Along with Rick Zimmerman (Senior Estimating Manager) and Scott Gammon (Senior Vice President), we opened up the Kansas City office in 2010. Based on the reputation AB had to me, my first impression was a feeling of intimidation when I looked at the news-worthy type of projects that AB has completed over the years. Once on the "inside", I have come to greatly respect the successful AB projects because of the detailed, and often innovative, planning and execution of the work that goes into the "typical" AB job.

What has been your most challenging project to date? What made it so challenging, and how did you overcome it?

The project I am currently working on, the US-69 Missouri River Bridge, has been the most challenging because of numerous factors, including the Missouri River, it being a design-build project, and there being essentially two jurisdictions! There are two DOTs/Owners, two states, two counties, two cities, and two levee districts. When you add in Union Pacific Railroad and the large number of existing conflicts between 13 different utility companies, you get a pretty complicated and challenging job. So far, the challenge has been met with very good teamwork and communication between the Owner, designer, and AB.

What is the best part about working for American Bridge?

At AB, you have the opportunity to work on some very important jobs that are more challenging than you'd normally see. Another great thing about working here is that the people see their time at AB as a career, not just a job.

If you could have worked on any AB project, since our inception in 1900, what would it be and why?

I would have to say the Paseo Bridge over the Missouri River in Kansas City. The Paseo Bridge was an iconic suspension bridge to the area that I saw all the time, and admired, until it was recently replaced.

What does a "typical" day look like for you?

There is no such thing. My day varies dramatically depending on the need for attention be it permitting, design, finance, safety, task plans, subcontractors/suppliers, field operations, etc.

What is your advice for young engineers within American Bridge who are looking to pursue a role in Project Management?

My best advice for anyone starting out with AB is to get exposure to the many different areas of work required for project execution. Keep your eyes open and ask questions.

What are some of your interests outside of work?

I am an outdoors guy and I enjoy lots of different activities, as long as I'm outside. I spend a lot of time with my family and traveling to my sons' soccer games.

45 YEARS AND NOT ONE REGRET

Dan Radu revisits the memories that shaped his life-long career at AB

After 45 years, Dan Radu was just about ready to say goodbye to American Bridge, but not before taking some time to reminisce on the only employer he's ever had. A veteran of AB's most notable projects, Dan led estimating and engineering teams with a gifted combination of a steady hand and an innovative mind. AB holds a lot of memories for him; triumphs and frustrations, joy and disappointment. But if you ask Dan, it's all good.

It was almost by chance that Dan came to work for AB. While attending college in Cincinnati, he was placed on a simple, concrete building on campus for part of his co-op. Across the way, a much bigger steel building was going up, and the work was being done by a company called American Bridge. "I kept watching the other (building) go up. And one day, the college had a career fair, and AB was there. I got an interview with them, and at the same time I also interviewed with two big oil companies down in Louisiana. The first one to answer me back was American Bridge, so I paid them a visit in Pittsburgh, they made an offer, and I accepted it." As fate would have it, Dan then received two offers from the oil companies, but turned them down. He had already joined the AB family.

June 18, 1969 marked Dan's first day at AB. He was placed on the General Motors Stamping Plant expansion project in Warren, Ohio, where GM's production had shifted from automobiles to tanks. He stayed there through project completion, and then moved back to Pittsburgh to work on the Pittsburgh National Bank Building, a prominent structure on the corner of 5th and Wood Streets in the downtown center. While briefly interrupted by a strike and a stint on the dismantling of the original Manchester Bridge and construction of Three Rivers Stadium, Dan remained in Pittsburgh until the job was done. It was an unforgettable job for Dan, as it's where he met his wife, a memory that he recalls with a chuckle. "She worked in the building next door to us, and one day, I went across the street for lunch, and Vern Decker, the superintendent at the time—we called him "Mother", and there was a reason for that—was there. When we came downstairs from the second floor, he grabbed a hold of this girl that was sitting on a stool, spun her around and asked her name. He pointed to me and said 'Karen, this is Dan. Dan, this is Karen.' And then walked away." One date led into many, and then to more than 44 years of marriage. "Probably my luckiest day," he says with a smile.

There have been some nerve-wracking moments for Dan as well. While working on the

Dan standing atop the Manchester Bridge during demolition in 1970

Independent Life Building (now the Wells Fargo Building) in Jacksonville, Florida, the team was faced with erecting a fairly unusual structure that was extremely large at the base, with the first seven floors sloping up to the main tower. The work was done with two, S2 stifflegs on towers that jumped up in the building, which was a total of 37 stories. During one of the "jumps" Dan recalls, the ironworkers went to lunch – and never came back. "There was myself, three foremen, and some ironworkers in a bolt-up crew that had never done it before, and we had no choice—we had to finish jumping it." Complicating matters was the fact that the crane had to stay within 15 feet of vertical, or the whole thing would topple over. Up about 20 stories, the remaining team finished the jump, but Dan was rattled after the experience. "By the time I walked off the building, myself and the other engineer were shaking, we were so concerned. To this day, I can remember going in to the office, very upset, and hollering at the superintendent, telling him we'd never do that again!"

One Friday afternoon, after the Independent Life Building wrapped, Dan got the call to come back up north—AB had won a contract for a new bridge, which was called New River Gorge and situated across a deep ravine in a picturesque, remote state park in West Virginia. It was to be a 3,030-foot arch, with a deck that stood 900 feet above the rushing water below. This bridge would test Dan's nerves, but was, as he says, a job of a lifetime. Six months were spent in Pittsburgh working on drawings, and settling back in to a routine. "We found an apartment, and it was nice to be in one spot where we knew people" said Dan. "Then, all of a sudden, they decided it was time to go to West Virginia, and that was a drastic change of scenery. At the time, you get what you get down there. I relieved (former AB CEO Bob) Luffy—he was in charge of getting the cableway up, and spent the next three and a half years down there finishing the job up."

It was on New River Gorge that Dan met Herb Goss, a timekeeper with a wicked sense of humor and a penchant for practical jokes. "When I first went down there, Herb gave me a hard hat, and I walked out with Luffy and everybody else to look at the site. I took the hard hat off, got in the car and drove back to meet Karen so we could go find a place to live. She took one look at me and said 'what the hell is wrong with you?!' I said 'what are you talking about?' 'Go look in the mirror!' Herb Goss had taken lead pencil shavings, rubbed them in the band of the hard hat, and it looked like a car tread went straight across my forehead!" It wouldn't be the last practical joke Herb pulled (such as cookies and candies that weren't exactly edible, or soap that turned your hands and face fire engine red), but Dan wouldn't fall for another. This was a job that got your legs under you pretty quickly.

New River Gorge Bridge, Fayetteville, West Virginia

Dan recalls a time when the New River Gorge team had to make some quick decisions that may have caused them to step on the toes of those who don't fully understand the bridge building business. "The weekend before we closed (the arch), some of the steel was giving us some issues. We got a call on a Saturday night that there was a loud noise out at the site. Well, we didn't see anything when we got out there, because it was pitch-black. The next morning, we went out, and it was like a friggin' pretzel (an oil well pipe casing that was a part of the arch temporary tie-back system had failed). We fixed it up, cleaned it up. They had this big ceremony planned for the big wigs from US Steel, the governor, and senators at 10 o'clock on Monday morning, when we would start closing the bridge. Well, unbeknownst to anyone else, we all got out there at 6 o'clock in the morning to close it, because if one more pipe broke, the whole thing was going into the gorge. And you really want to close it before the sun comes up, before the steel starts to heat and expand." Dan, a group of engineers, and a vice president decided they had to get out and close the arch, well before the official festivities started. "It's closing, one way or the other, because if it's together, it can support itself," explained Dan. Despite the obvious risk, the team, along with several ironworkers, went out and closed it. When asked about how the officials reacted to the rather anti-climactic ceremony, Dan just shrugged and said "I don't know. Nobody was going to come out and talk to us, because we're out in the middle, 900 feet in the air!"

"In 45 years, there's so much...I have no regrets about retiring. I can proudly say I spent 45 years working for the same company and never once regretted having worked at American Bridge for that long. It's been a good experience, an experience I'll never forget."

New River Gorge will always be Dan's favorite project, and always hold a special spot on his long resume of successful jobs. "That was an experience, that job, and there's not going to be another one like it." Just like there won't ever be another Dan Radu. In his 45 years at AB, Dan has seen many big changes, from ownership and direction to capabilities and new, innovative ideas. "The real change is the diversity of what we're starting to look at, and the complex joint ventures we're involved with."

Ask Dan what he'll miss, and you'll hear a common refrain amongst retirees: the people. "It's a tight-knit organization. You have friendships that will last forever" says Dan. He counts AB's estimating department among his closest friends, as well as many of the engineers, people on jobsites from Washington to New York, and those who have already retired from AB. "I've spent a lot of time working with Hokey (retired superintendent Ugo Del Costello). He's an engineer's dream—he'll work through different problems and give you sketches on things. He's a friend."

And if you ask Dan what he's proud of, he'll tell you that he loves seeing AB-built structures on TV, or in a movie, and being able to name someone who worked on that job. One of his favorite pictures is of his two grandchildren on an overlook for the new San Francisco-Oakland Bay Bridge. "It's our intention, now that I'm going to be retired, to meet them and take another picture with the grandchildren now that they're older, and hang the two photos up on the wall" he explained.

Retirement will be filled with opportunities to do the things Dan wasn't able to before, like seeing his grandkids whenever he wants and doing some work around the house. "In 45 years, there's so much...I have no regrets about retiring. I can proudly say I spent 45 years working for the same company and never once regretted having worked at American Bridge for that long. It's been a good experience, an experience I'll never forget." ✦

GET TO THE POINT

Chief Estimator Lanny Frisco retires

When Lanny Frisco retired as Chief Estimator in 2015, he made it quite clear that fanfare was neither expected, nor desired. And for everyone that knows him, that's just the way he is. Never one to ramble on with long-winded speeches, Lanny spent his entire career with American Bridge, and his contributions to the Company, his staff, and his peers will not soon be forgotten. In keeping with his style, we've chosen to honor his many years of service the only way we know how—brief, direct, and with no nonsense. Lanny, we hope this makes you proud.

"Lanny is as solid as they come; he's a true AB professional, and he has my highest respect."

—Mike Cegelis, Senior Vice President

"Lanny Frisco has earned my respect not because of his position or title but because he is loyal, honorable, modest, inspiring and hard working."

—Ugo "Hokey" Del Costello,
AB Superintendent (retired)

"Lanny is highly respected in the construction industry due to his great character including integrity, fairness, honesty, and knowledge."

—Dan Edwards, Chief Estimator

"Early in his career, Lanny worked out of the Pittsburgh Regional Engineering Office of AB assigned to repair and maintenance of steel mill facilities working principally in Fairless Hills, outside of Philadelphia. He moved into the Estimating Department in the late 1970's where he truly found his niche. If my memory serves me correctly, Lanny was at the helm of estimating and securing work for American Bridge Company for about three decades of his forty-five year career. In an area of the business that has many an unsavory character and shady business practices, I'll always remember his service as being underpinned by honesty and fair dealings which earned him great respect in our business. It has been my privilege to have known Lanny and worked with him my whole career, and I sure do miss looking at his meticulously prepared, handwritten cut/add sheets on bid day. Lanny is one of the handful of guys that hung in there with AB through some really tough times. He helped personally connect the legacy of the old American Bridge with the growing capability of a new generation. Many thanks and my personal respect for a great career of service to AB."

—Mike Flowers, President and CEO

Honoring a friend and legend:

ANGUS ADAMS

The Mohawk Indians have always been a close knit community, so when American Bridge Superintendent Angus Adams, a Mohawk Indian, suddenly passed on Sunday, May 31, 2015, the entire Cornwall Island and the Snye, Quebec area, as well as the American Bridge family, was shaken.

Angus Adams was a longtime AB employee. With more than 28 years at AB and over 45 years as an Ironworker, he worked on many notable projects, mostly in the New York City area, such as the Williamsburg Bridge, Bayonne Bridge, George Washington Bridge, Bronx-Whitestone Bridge, Triborough Bridge, Throgs Neck Bridge, and the Marine Parkway. He also worked on many movable bridges including the Lower Hack, Conrail Upper Bay, and Conrail Hack in Jersey City, the Reserve Basin Lift Bridge in Philadelphia, and the Ninth Street Bridge in Brooklyn where he was honored as the 1999 Ironworker of the Year by the Allied Building Metal Industries—an award that was truly deserved.

Angus was known for his innovative way of thinking; if there was a problem, he had a solution. During his more than 28 years at AB, Angus and his team, of course, encountered problems – problems that had everyone perplexed – everyone but Angus, that is. His clever and inventive solutions not only amazed everyone, but also saved AB projects time and time again. As AB Project Engineer Jim Thornton recalled, the team ran into a tough situation on the Reserve Basin Lift Bridge. There were big hex nuts that needed to be removed, but could not be damaged. The team didn't have a pipe wrench with adjustment large enough to fit the nut, but of course, Angus had an idea. He found a piece of scrap plate, traced out the shape of the nut on the plate, and burned the shape free-hand using a piece of bar as a straight edge. Within minutes, Angus had a custom hex wrench to fit the nut perfectly. Angus was never one to boast about his ingenuity; he did what he needed to do, but always quietly. On the same project, another problem was encountered that had the Ironworker crew puzzled. The team got a sheave stuck and didn't know how to get it out. Angus grabbed an 8 foot 4x4, placed it in the perfect spot, applied a bit of pressure and the piece jumped out of the hole. He then quietly returned to what he was doing. "These are the types of things he did every day," recalled Thornton.

Angus is a great example of an AB legend; AB will never find another Ironworker quite like him. His passing was a great loss to the community and the AB family. He worked hard for AB all the way up until his last days. Prior to his passing, Angus was working as a Superintendent on the Three Nations Demolition job in Cornwall, Ontario. The project currently employs 26 ironworkers and operators, 25 of which are Mohawks, proving that the Mohawks are still very prevalent in the tall steel structure business to this day. ✦

I met Angus when he was 67 while I was 24, and we became a bit of an odd couple. I grew to look up to him like a grandfather, and, for some unknown reason, he actually gave me the time of day. I've even had the privilege of growing close with his family since his passing. He had been running work for longer than I had been alive, but was never condescending about the vast gap in experience between us. He was always patient and willing to teach. I learned so much from him, and we lost so much wisdom he had yet to share. He left some boots that I don't think can be filled.

–Kara Mullin
Project Engineer

I'll always remember Angus as a gentleman of character in a tough business with never a bad word about anyone. I'll also remember him for his practical and yet innovative approach to complex problems, always tinkering with modifications to tools and equipment to solve tough problems. Many a young civil engineer has grown up in our business working alongside Angus leaving them much richer for the experience. He will be greatly missed by his many friends at AB.

–Mike Flowers
President and CEO

SKYWALKING:
HOW THE MOHAWK INDIANS SHAPED CITIES

The Mohawk Indians have had a significant impact on the building of tall steel structures in the past and in the present, including but not limited to, the Empire State Building, George Washington Bridge, Chrysler Building, United Nations Building, World Trade Center, Sears (Willis) Tower, the Golden Gate Bridge, the Lions Gate Bridge, and the Unisphere – many of these AB projects. They eventually even traveled to New York City, bringing their families with them, to live and work on these structures and soon earned the title "Skywalkers".

The Mohawk Indians, specifically those from the Kahnawake nation, were integral to the completion of these structures because of their reputation for fearlessly working at dizzying heights. This notion dates back to the 1880's when a bridge was being constructed over the St. Lawrence River. The Kahnawake Reservation lies just south of the river in Quebec, Canada, so many of the Mohawk Indians found work there. They became ironworkers, a difficult and dangerous job, thriving hundreds of feet above the water and their success started the legend that they could work at any height.

One of the projects built by AB and known for having Mohawk Indians workers was the Unisphere, a unique, globe-like structure that was the theme symbol for the 1964-1965 New York World's Fair. It was a stainless steel, 12-story high representation of the world, weighing in at 500 tons. The Mohawk Indians were very involved in the creation of this structure in New York and because of their involvement, there is physical evidence placed on the sphere to represent them. The capitals of each nation were marked by a light on the surface, but there was also an additional light, one that represented the Kahnawake Indian Reservation and their hard work on the project.

Safety's Biggest Advocate:

PAYING TRIBUTE TO **HENRY MYKICH**

Heavy hearts received notice of American Bridge's longtime Safety Director, Henry Mykich's, passing on August 22, 2015. He was a beloved member of the AB family and is greatly missed. He was a passionate advocate for safety, and was dedicated to ensuring everyone went home at the end of each day. Henry devoted 30 years of his life to AB, not to mention almost 40 years to the health and safety industry.

Henry Mykich (left) and AB President Mike Flowers (right)

Prior to joining AB, Henry worked nine years for a large steel manufacturer at one of its coal/coke chemical facilities as an Industrial Hygiene Technician and Safety Engineer, before becoming the plant's General Supervisor of Safety.

In 1987, when Henry joined AB, he started as a Safety Engineer and was later promoted to the Health and Safety Director. As AB's Health and Safety Director, Henry had a big job to fill. His overall responsibility was ensuring safety in the workplace and at all project sites. He was involved with some of the most complex and specialized bridge, manufacturing, and rehabilitation projects across the U.S. and abroad; including work at great heights and in marine environments. Henry's job was no easy task, and AB was lucky to have someone like him on board to direct the safety efforts of the Company.

He was also very involved in other aspects of safety, including continuing his education. He never wanted to stop learning. Within the field of health and safety, his ongoing studies included environmental management and regulations, hazardous materials fire training, crisis management, OSHA 500/502 construction industry outreach, instructor training for industrial lead paint abatement projects, and other numerous health, safety and industrial hygiene-related curriculum. He was also a former Co-Chair of the Safety and Health Committee of TAUC (The Association of Union Contractors, formerly the National Erectors Association) and served on the ANSI (American Standard Institute) A10.13 Steel Erection subgroup. He was also a professional member of the American Society of Safety Engineers.

Because of Henry's dedication to AB and the safety industry, AB wanted to do something significant to commemorate him and his years of service to the company. The annual President's Safety Leadership Award, implemented four years ago, which recognizes an AB employee who has shown great leadership and made a personal commitment in support of American Bridge's Safety Vision, was renamed the Henry Mykich Safety Leadership Award in his honor. Henry was the biggest advocate of safety and we hope to honor his legacy through the spirit and annual presentation of this award. Henry will be greatly missed by the AB family.

Henry dedicated himself to the safety of all American Bridge employees, by his actions, he made a difference. Let's keep Henry's mission alive, striving for zero harm to ensure everyone goes home safe each and every day.

–Joe Corvello,
Director—Health, Safety, and Environment

Henry was one of the most cheerful and positive individuals I have had the pleasure to be acquainted with. He was a great mentor and will always be remembered.

–Jody Porterfield
Safety and Health Manager

I'll always remember Henry as a guy that had a contagious zest for life and greeted each day with a wry smile and optimism. Henry had an unassuming way of earning the respect of craft and managers alike. He was a mentor, an educator, and a leader and I can think of no better way to honor his legacy than to redouble our efforts to achieve a zero incident workplace. It is most appropriate that our annual Safety Leadership award now bears his name.

–Mike Flowers
President and CEO

NEW EMPLOYEES

Felipe Acero Project Engineer, Tappan Zee

Atieh Anbary Design Engineer for Temporary Works, Tappan Zee

Lorraine Bell Accounting Clerk, Queensferry

Ronald Benson Foreman, Friendship Trail

Zachary Burke Document Imaging Specialist

Greg Bussey Superintendent, Portageville

Justin Cobbett Help Desk Technician

Craig Cormier Field Specialist, Angus L. Macdonald

Brian Dunay Financial Analyst

Ryan Ferguson Field Engineer, Tappan Zee

Douglas Ferrara QC Engineer, Tappan Zee

Kent Findley Fabrication Engineer, Tappan Zee

Michael Fischer Director - Business Development Northeast

Brian Fitch Director of Project Controls

Robert Gehris Field Engineer

Heather Godwin Corporate Trainer

Huriel Gonzalez Pre-Construction Manager/ Estimating Manager

Robert Havlick Marine Superintendent

Jonathan Hewko Field Engineer, Horseshoe Arch

Jarret Kasan Engineer

Rebecca Keller Payroll Coordinator

Nicolette Ledwich Proposal Specialist

Chavis Lunceford Project Manager

Michael Notarangelo Senior Engineer, Queensferry

Robert Macias Superintendent, Edmonton

Michael Notarangelo Senior Engineer, Queensferry

David O'Dell Project Superintendent, US-69

Thomas Palansky Director – Business Development Midwest

Alan Pendelton Foreman, Friendship Trail

David Phillips Senior Project Engineer

Andrew Rodgers Field Engineer, Tappan Zee

Kenneth Shovlin Senior Estimator

Andrew Singh Field Engineer, Tappan Zee

Chris Urtz Field Engineer

Bradd VanderVeen Project Engineer, Horseshoe Arch

Hailey Votta Field Engineer, Tappan Zee

Brian Walker Lead Gantry Driver, Queensferry

Tyler Zak Field Engineer, Tappan Zee

TITLE CORRECTION *Scott Tudor, Senior Engineer*

EMPLOYEE ACHIEVEMENTS

Bill Batzel Field Engineer
Bill earned his Pennsylvania PE. Bill currently works as a Field Engineer on the Tappan Zee Hudson River Crossing project in Tarrytown, New York.

Nick Greco Chief Engineer – East
Nick earned his PEng. Nick currently works in the corporate office as Chief Engineer – East.

Michael Flowers CEO and President
Mike became a new member of The Moles, as well as the National Academy of Construction.

Andy Pelz Payroll Supervisor
Andy Pelz became a Certified Payroll Professional. Andy works as a Payroll Supervisor in the corporate office.

Kelvin Chen Design Engineer
Kelvin earned his California PE. He is currently developing temporary works and means and methods for the Angus L. Macdonald project in Halifax, Nova Scotia.

Matt Fry Document Control Specialist
Matt became an OnBase Certified System Administrator and an OnBase Certified Workflow Administrator.

Todd Owens Design Manager
Todd successfully completed the requirements for the nationally recognized Designated Design-Build Professional™ (DBIA™) certification.

Heather Nicholson
Marketing Communications Manager
Heather earned her Foundation Certificate from the Association of Proposal Management Professionals (APMP).

Chris Kite Field Safety Engineer
Chris earned his Associate of Safety Professionals certification from the Board of Certified Safety Professionals (BCSP). He is currently working in Texas on the Horseshoe Arch Pedestrian Bridges.

Jody Porterfield
Corporate Safety and Health Manager
Jody earned his Associate of Safety Professionals certification from the BCSP.

Mike Cegelis Senior Vice President
Mike successfully completed the Executive Program "Closing the Gap Between Strategy and Execution" at the Massachusetts Institute of Technology Sloan School of Management.

AB AWARDS

- The **Las Vegas High Roller** project was a 2015 IDEAS2 National Award Winner in the category of greater than $75 Million.
- AB received four **Contractor Performance Awards** from the Missouri Department of Transportation (MoDOT) for work done in 2013. The awards were in the categories of Quality, Prosecution and Progress, Contract Compliance, and Contract Administration.

CURRENT CONTRACTS

- **Explosives Handling Wharf #2** Silverdale, Washington
- **Horseshoe Arch Pedestrian Bridge** Dallas, Texas
- **Three Nations Bridge Demolition** Cornwall, Ontario
- **US-69 Missouri River Bridge** Riverside, Missouri
- **Freeport Harbour Berths 3, 8, & 9 Refurbishment** Freeport, Bahamas
- **Blount Island Marine Terminal Wharf Reconstruction** Jacksonville, Florida
- **Atchafalaya Pipeline Suspension Bridge** Melville, Louisiana
- **Friendship Trail Demolition** Tampa, Florida
- **Portageville Bridge Replacement** Portageville, New York
- **Queensferry Crossing** Edinburgh, Scotland
- **Angus Macdonald Bridge Suspended Spans** Halifax, Nova Scotia
- **M48 Severn Bridge Main Cable Inspection** United Kingdom
- **The New NY Bridge (Tappan Zee Hudson River Crossing)** Tarrytown, New York
- **Delaware Memorial Bridge First and Second Structures—Dehumidification of Main Cables and Anchorages** Wilmington, Delaware

AB PROJECT WINS

Atchafalaya Pipeline Suspension Bridge
Melville, Louisiana

Friendship Trail Demolition
Tampa, Florida

M48 Severn Bridge Main Cable Inspection
United Kingdom

Delaware Memorial Bridge First and Second Structures – Dehumidification of Main Cables and Anchorages
Wilmington, Delaware

Corridor H Throughway
West Virginia

Portageville Bridge Replacement
Portageville, New York

Edmonton Valley Line LRT P3
Alberta, Canada

AB BIDS FAREWELL TO FIVE LONG-TIME EMPLOYEES

Leaving behind large shoes to fill, AB was lucky to have these men on board for so many years—196 years combined to be exact.

With projects all over the world, it's not often that you find a multitude of AB staff all in the same place at the same time. But on May 22, there was a special occasion and the office was bustling with people from near and far. Although bittersweet, it was a joyous reunion of sorts, an occasion that brought in not only the recent retirees to be honored, but retirees from the past as well.

In the last year, AB has said goodbye to five people who had a major impact at AB. Dan Radu, Jon Young, Ugo Del Costello, Lanny Frisco, and Joe Grygiel all came back to the AB headquarters for one last hurrah to celebrate their retirement. It was an informal, relaxed gathering of current AB employees, interns, past retirees, the retirees themselves, and their wives, children, and grandchildren that allowed people to catch up with one another over drinks and hors d'oeuvres. A specially designed AB cake, featuring an AB hard hat topper and a depiction of a bridge on the side, along with the names of the five retirees being honored provided a sweet finish.

Not long into the party, a whistle was heard - Mike Flowers, President and CEO of AB, called for the attention of the attendees who were still catching up with one another. It was time to present the retirees with something that would represent the time and hard work they put into the Company, a unique and personalized gift that could never be replaced. As Mike went on, he explained that usually for a retirement, companies will give gold watches, or something of the sort. Well, AB always strives to

"You have paved the way for all of us to follow you."

—Mike Flowers, President & CEO

think outside of the box—not only on challenging projects—and this gift only proved that. Each retiree received a hard hat, but not just any hard hat. These hard hats were bronze dipped, and each one had the name of a retiree, along with their number of years of service, carved into the coating.

Mike Flowers gave a short but heartfelt speech about how much these men meant and will always mean to

the Company. “You have paved the way for all of us to follow you” Mike remarked, referring to their hard work throughout the years. Mike made sure to call attention to the fact that these five men gave a combined total of 196 years to the Company—a feat that is admirable, commendable, and praiseworthy.

Whether retirement plans involve moving away, generating new hobbies, spending more time with family, traveling, or the like, it is no doubt that these retirees will make the most of their free time. But in the meantime, American Bridge has very large shoes to fill with the retirement of these great men who gave so much of their time to help shape AB into what it is today. AB will always be grateful for all the hard work and years these men gave to the Company and they will be greatly missed. ✦

HURRICANE JOAQUIN

On October 8th, American Bridge employees donated goods to Bahamians that were devastated by Hurricane Joaquin, a category 4 storm that swept through the southern islands of the Bahamas. Four pallets full of items were donated including cleaning products, rice, oats, water, and hygiene items. The effort hit close to home, as AB is currently working on the Freeport Harbour Berths 3, 8 & 9 Refurbishment project in Freeport, Grand Bahamas.

Pictured L-R: Mr. Major (Relief Coordinator), Rob Conroy (Project Manager), David Phillips (Senior Project Engineer)

WQED'S DESIGN LIVES HERE

American Bridge was a sponsor for the program Design Lives Here, an annual engineering outreach program hosted by WQED, a local Pittsburgh public broadcasting station with a focus on education, and Inventionland, America's largest "invention factory" where new ideas are designed, engineered, and packaged.

This program supports WQED's goal of encouraging middle school students from local schools to become involved in and enjoy science and engineering so that they will then hopefully consider a career in STEM (science, technology, engineering, and math).

The semester-long program closed with a "Day of Engineering" attended by a number of our talented Co-ops. Participating as mentors for the program's middle school students, AB Co-ops led teams that worked together on inventions and engineering projects. The students then presented their projects to the Inventionland team in "Shark Tank" style pitches, playing off the popular television show where entrepreneurs pitch their ideas to a board of possible investors.

The Day of Engineering, as well as the entire semester, was successful and all participants walked away with a great experience. With the support of their sponsors, WQED continues to make more progress through this program, in contributing to their ongoing mission of instilling a love of science and engineering in middle-school students.

CENTURY OLD AB BRIDGE STILL STANDS IN ICELAND

HÁKONARSTADIR BRIDGE **Location:** Eastern Iceland **Completion Date:** 3/31/1908 **AB Order #:** C-1151

From the United Kingdom, to Brazil, American Bridge has completed projects of all types across the globe. Even when the Company was first incorporated, it still found work outside of the United States. Over 100 years ago, back in 1906, just six years after its establishment, AB found itself working on the means and methods and fabrication for a bridge in Iceland.

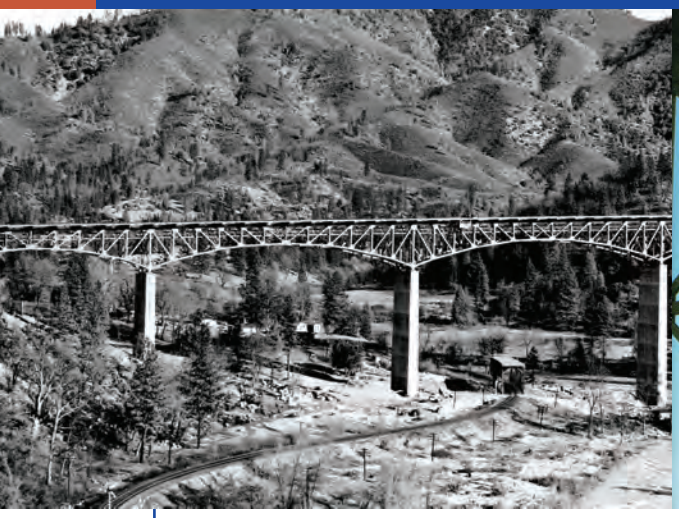
Fabrication of the bridge started in the U.S. after the order was received on November 30, 1906, and just a couple of months later on January 17, 1907, the completed roadway bridge, with a 9 foot high through truss and a span length of 90 feet, was shipped from New York to Iceland via Copenhagen. The bridge was then erected in Eastern Iceland over the Jökulsá River in 1908.

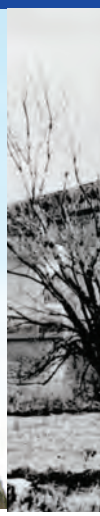
When the Hákonarstadir Bridge was built, cars weren't even considered. It was built simply to allow horses and pedestrians to cross the river. When 1953 came around, and cars were in use in the country, as a very important thruway between northern and eastern Iceland, it was necessary for the bridge to be renovated. The truss had to be lifted and new foundations were constructed, which allowed for the bridge to support more weight, including vehicles.

In 2008, when the bridge was completely restored, the general condition of the steel was still good, but it was in need of a new rail and repainting. To give a nod to history, the Hákonarstadir Bridge was painted the same white color as it was when first built. Once the renovation was complete, there was a small ceremony and a new name plate was unveiled, very similar to the original plate with American Bridge Company being recognized as the original fabricator. People from the area, as well as workers from the road office in Eastern Iceland were in attendance, as well as the first truck that drove across the bridge.

Typically, because of the environment, a bridge in Iceland doesn't last this long, but after over 100 years this one still remains usable because of its distance from the ocean environment. Today, the Hákonarstadir Bridge is the oldest bridge in Iceland still in use. However, its workload is considerably lighter—it now only serves one farm, the one it was named after—Hákonarstadir.

FLASHBACKS





ANTLER CREEK BRIDGE

Location: Redding, California
Completion Date: 8/1/1941
AB Order #: G-7905

75 years ago the Antler Creek Bridge was constructed. This seven-span bridge crosses the Sacramento River about 30 miles north of Redding, California. The bridge includes a five span continuous deck truss with spans of 189', 252', 273', and 189', plus two beam approach spans of 81' and 94'.

SEAWAY INTERNATIONAL BRIDGE (SOUTH CHANNEL)

Location: Cornwall, Ontario/Massena, New York
Completion Date: 7/13/1959
AB Order #: V-1066-76

American Bridge fabricated and erected the South Channel of the Three Nations Bridge (previously known as both the Seaway International Bridge and Cornwall-Massena Bridge) 57 years ago in 1959. Work involved all superstructure and approaches, including towers, suspended decks, concrete roadway surface, and cables. This three-span, two lane, 3,479' suspension bridge serves as an international border crossway, crossing the main navigational channel (South Channel) between Ontario, Canada and Rooseveltown, New York. AB is currently working on the demolition of the North Channel truss which is entirely in Canada (Three Nations Bridge Demolition).

GEORGE WADE BRIDGE

Location: Harrisburg, Pennsylvania
Completion Date: 7/1/1972
AB Order #: K-4116-45

44 years ago, AB constructed the George Wade Bridge (also known as the North Bridge) a 5,185′ crossing of the Susquehanna River in Harrisburg, PA. The bridge holds six lanes, allowing for a daily traffic volume of 64,000 to cross the Susquehanna River carrying I-81 and the Capital Beltway. The bridge was recently rehabilitated in 2012.

GREEN RIVER BRIDGE

Location: Hendersonville, North Carolina
Completion Date: 4/1/1995
AB Order #: 63002

21 years ago, American Bridge was responsible for the rehabilitation of the Green River Bridge; twin steel deck plate girder bridges on I-26 in Hendersonville, North Carolina. The work included the addition of cover plates on bottom flanges of girders, removal of expansion dams and conversion of the bridge from simple span to continuous, installation of larger new dams at the abutments, and resurfacing of the bridge deck. AB was also the original constructor of the first bridge, completed in 1968 under Order #K-1293 with a cableway over the 219′ gorge.

SEE SOMETHING
SAY SOMETHING

American Bridge has a strong safety culture with a mission of a **zero incident workplace**. But because hazards can occur at any time, AB is taking steps towards bringing hazards to the attention of all employees, both on the job and in the office, with the new 2016 safety campaign **"See Something, Say Something"**.

A hazard in the workplace is an act or condition that has the potential to cause injury, illness, or death to a person and/or damage to company property, equipment, and materials. Safety is the responsibility of everyone working on the jobsite or in the office, not just our safety professionals. Particularly in the construction industry, it is imperative to be mindful of hazards, as they are present in everything we do.

This 2016 initiative relies heavily on all employees working together to proactively approach safety so that everyone can come to work every day and go home every night. It is the responsibility of the employees to do their part by stopping the action or acknowledging the condition and informing others of the hazard.

In January, at the start of the campaign, Joe Corvello, Director of Health, Safety, and Environment, presented this new initiative with a seminar to educate employees on the campaign, how to recognize hazards, and then how to control them in order to prevent injuries. All employees were also given wristbands engraved with "See Something, Say Something" to serve as a daily reminder to stay committed to safety. Benefits and rewards will be given to those who actively participate in the program by reporting near-miss activities—an unplanned event that did not result in injury, illness, or damage, but had the potential to do so. As the year progresses, AB hopes this new motto will heighten awareness for all employees and expand our already vigorous safety culture.

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CONNECTIONS

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