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President's Message

Richard S. Prentice

I find many U.S. Interstates not flowing as well as they were designed to, but that's not surprising. The Interstate Highway System was authorized when the nation's population was less than 170 million; the population is now approaching 300 million. We drove nearly 3 trillion miles in 2005, an increase of 25% since 1995. Statistics show that there are over 200 million automobiles and 26 million trucks in America. Ninety-three percent of the nation's freight is hauled over our highway network, and our Interstate System is the central component of that network. These 40-ton tractor-trailers have become an ever-present sight on our nation's highways. U.S. Secretary of Transportation Mary Peters says, "These figures underscore the importance of our efforts to fight traffic congestion. It is clear that our ability to keep things moving smoothly and safely is key to keeping our economy strong." Every year billions of hours are wasted in traffic jams, resulting in a loss of billions of dollars in productive time.

Environmental laws will not allow endless widening of our highways, so other solutions are needed. High Occupancy Vehicle lanes were built primarily for buses, but they also promote ridesharing through carpools and vanpools. People like to drive their cars, but I just read an article that showed carpools and vanpools are catching on in our congested urban areas. Why? Because HOV lanes move higher volumes of passengers into and out of the cities, reducing traffic congestion. Another tool we have at our disposal is Intelligent Transportation System. It may not be the total solution, but it provides ways to improve the congestion problem. ITS can monitor traffic flows, alerting drivers of congested areas with variable-message signs and radio announcements. Drivers can then decide to take alternate routes to avoid the congestion.

Today's traffic is a nightmare, so what is it going to be like in 25 years? Looking into the future, platoons of smart cars will be able to travel along one or more smart highway lanes at 60 MPH with only 18-inches between their bumpers. The result is each smart lane will be able to carry the equivalent of 4 non-smart lanes. This very close separation of the smart cars in the platoon remains safe because the smart cars would be communicating to a central computer and to other cars in the platoon at a rate of 50 times per second. Sound far-fetched? Not really. In 1997 the U.S. Congress took automated highway technology from the drawing board and onto the highway. The test bed was a 7.6-mile section of Interstate 5 in San Diego, California. Thousands of high-strength ceramic magnets were imbedded into two lanes (one in each direction) of the highway. Computers and sensors were installed into eight full sized Buicks, modifying them into smart cars. The eight-vehicle platoon ran a total of 8000 miles at 65 MPH, carrying 4000 passengers and recorded no safety incidents. The test was a resounding success but the project fell by the wayside because of the high costs involved.

What's the alternative? Many of our nation's highways are financed with tolls. Toll roads are a valuable option because they generate revenue through tolls, not gasoline taxes. Tolls that vehicles pay to use the highway generate funds to maintain that highway. But while tolls have increased, they have not kept up with inflation. It would be political suicide for a state to raise tolls, but if a private operator does it, it's just a business decision. So state governments have begun to lease their highways to private operators. Select highways in Illinois, Indiana, Texas and Virginia have already been leased; Pennsylvania and New Jersey are now considering leasing their toll roads to private operators. The money generated by the leases can be used for other transportation projects or for debt relief. At first glance, toll roads may look like pots-of-gold. Before coming to any decision, each state government should weigh all the pros and cons, because the impact will be felt for generations. I'll use Indiana as an example. I-80/I-90 has been a state toll road for about 50 years. This past July a private group paid Indiana a one-time amount of $3.8 billion to operate, maintain, and collect tolls on the road for 75 years. In the first 4 months Indiana pocketed $55 million in interest from that $3.8 billion payment. This is money Indiana can spend on transportation projects or debt relief. However, motorists are concerned about the amount of tolls this private group can charge. Cars traveling the whole 157-mile long road will see tolls go from $4.65 to $8.00 and commercial truck tolls will increase from $14.55 to $18.00. Indiana motorists expect more toll increases will come. State governments need to keep in mind that these leases are for 75 to 99 years, so road users are left paying automatically escalating tolls for decades.

This is my last President's Message. The year just flew by for me! I want to thank everyone for giving me the opportunity to lead the ASHE organization. I feel that I have kept my promise to represent and serve you to the best of my ability. We have set an ambitious course

"President" continued p. 21

Record Load Moves through PennDOT District 10-0

Clayton G. Fisher P.E., SP&K Engineering, Inc.

Superload crossing US 119 on US 22 I-Beam Structure

EME Homer City Generation L. P., an electric power plant located in Indiana County, recently suffered the loss of the main generator service transformer for their 650-megawatt (MW) unit #3. Since this power station sells energy to the Pennsylvania, New Jersey and Maryland power pool and has the capacity to serve two million customers, the loss required immediate attention. The lack of 650 MW from the total capacity of 1,884 MW for the entire plant was costing EME several hundred thousand dollars per day. It became necessary to purchase a replacement transformer. After one initial prospect fell through, a replacement was found at a power station located in Connecticut and was subsequently purchased.

After the purchase of the replacement transformer, it was transported by barge down the East Coast to Norfolk, Virginia. Due to its makeup, three large steel cylinders with copper windings, the transformer was transported by its own train, consisting of a locomotive and one specialized rail car, to carry it to Blairsville, Pennsylvania. The rail system was not able to carry the massive load any further. The rail line to the plant is mainly a coal transport system and was limited to 300 tons. At 387 tons the transformer was approximately 30% over the capacity of the rail line. Another rail line to the plant from the north was in poor condition and contained two structures that would need strengthening to carry the large load. This strengthening could have taken up to 6 months to complete. A third rail line to the plant was open, but was a spur line and was nine miles away from the Blairsville tracks, along State Route 119 (SR 0119).

At this point it was decided that transferring the superload to the spur line would be the most time efficient and cost effective method for completing the transformer's journey. But how would the load travel the nine miles left to go to connect with the spur line? Could the structures on those sections of highway handle that kind of load? It would take a team effort to answer these questions.

EME Energy needed the services of a rigging company, the oversight and review capabilities of PennDOT, and an engineering firm to complete the next phase of the transformer's journey.

Mammoet, a heavy lifting and transporting company specializing in this type of work, was recommended to EME by General Electric to move the massive load. Their experience in this type of work was vital in streamlining the process of moving the transformer. PennDOT District 10-0, the owner of the structures in question, worked diligently with EME to find a solution that would accommodate the power plant and maintain the integrity of the highway system. SP&K Engineering, Inc. of Uniontown, PA was tasked with structural analysis of ten highway structures. This analysis included rating two AASHTO I-beam structures, two concrete arches, three precast box culverts, two adjacent box beam bridges, and one rolled section steel bridge. These structures were rated using the axle loads and spacings of the transporter layout.

As time progressed, the load approached the Blairsville transfer point. Mammoet had supplied the proposed route of the load to PennDOT and wheel loads were set, in accordance with PennDOT Design Manuals. Final configuration for the load consisted of two 14-line Goldhofer trailers, three tractors, an overall length of 344 feet and a gage distance of 12.1 feet (16 feet overall axle width). The combined axle loads of this configuration reached 1,500 kip (a weight over twenty times that of the HS-20 Truck). With approval for this configuration, SP&K Engineering was on a fast track to analyze ten structures.

Several structures to be analyzed had been recently designed due to an improvement project completed by PennDOT District 10-0 for the SR 0022 and SR 0119 corridor. Utilizing the original

"Superload" continued p. 9

"Superload" continued from p. 7

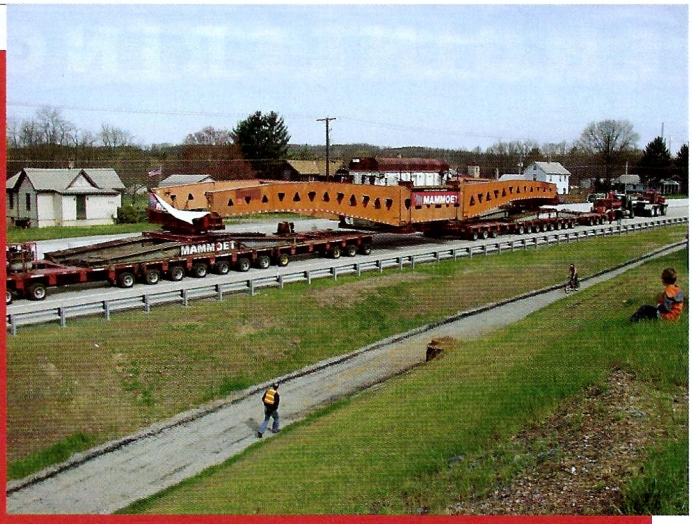
design calculations, special live loads were entered into the analyses. As the analyses progressed, different issues for each type of structure were noted.

Box culverts were the least vulnerable structures along the route and were quickly verified as not being weak links in the chain of structures leading to the plant. Their small spans permitted only small portions of the superload to be transmitted to the precast boxes, which in turn were found to behave well, with controlling ratings being equally distributed to walls in flexure, bottom slabs in shear, and also bottom slabs in flexure.

The AASHTO I-Beam bridges also behaved well under the extraordinary load. The first AASHTO I-Beam structure was a single span with splayed beams carrying SR 0022 over SR 0119. The second was a three-span continuous structure carrying SR 0119 over Blacklick Creek. The first structure exhibited controlling ratings under flexure for the Strength II limit state. The second resulted in a controlling rating under shear for the Strength II limit state.

Two adjacent box beam structures were evaluated; one being a single span carrying SR 0119 over a township road, the other was a two-span structure simply supported with a wall pier. The adjacent box beam structures were expected to perform well, but due to the age of the beams, and the fact that adjacent box beam bridges were under scrutiny due to a recent failure of an exterior beam on a bridge crossing over I-70 in a neighboring district, they were regarded with some distrust. Yet, these structure's ratings were acceptable, with flexure controlling in the Strength II limit state for the single span, and shear controlling in the Strength II limit state for the two-span structure.

The concrete arches varied in their ability to handle the record load. One structure was easily verified as viable, due to its depth under fill. The deeper the structure the lower the live load influence on arch. In this case, the depth of the arch was so great that the dead load due to the fill was all that was required to be analyzed and live load was discounted entirely. However, another arch along the route proved to be difficult to analyze. It was an older design and calculations were unavailable. Ratings for the structure seemed unreasonably low and therefore a solution was found in a comparative study; using a PHL-93 loading with full lane load and comparing it to the superload. Utilizing a common sense approach, the equality was established and the capacity of the arch was validated for the superload.



Superload traveling north on US 119

The steel rolled beam structure, carrying SR 0119 over an abandoned rail bed, also proved difficult in analysis. With the suggestion of Gerald McClelland, a consulting engineer working with Mammoet, special attention was given to the bearing stiffeners and they were found to be under-designed for the superload. Also, the pier, a two column bent design, did not have the capacity to support the massive transformer. The solution in the case of the bearing stiffeners was to install temporary stiffeners of red oak block wedged in between the flanges of the rolled sections. Installing a column of oak cribbing from the crash wall at the base of the columns to the pier cap resolved the pier's deficiency.

Providentially, the morning of April 17, 2006 came with clear sunny weather and four low gear ratio trucks were connected to the two Goldhofer trailers that were configured to carry the transformer over District 10-0's highways. After pulling the load onto the highway, two trucks moved it slowly eastward along SR 0022 never reaching speeds above 13 MPH. At the first structure a grade of 6% was encountered causing a third tractor to be attached to the load. Pulling the load across the structure, the trucks attempted to stay within limits painted on the bridge deck to keep load off the fascia beam, and access the exit ramp to SR 0119 north at the same time.

After successfully navigating the exit ramp, the 21-foot tall transformer and trailer moved under the structure with little room to spare and continued towards Homer City. Utilizing the high end of the overpass's 6% grade provided the clearance for the over-height load.

First one structure then another was crossed, each carrying the load without signs of strain. As the 1940's concrete arch was crossed, Tom Knieriem from PennDOT ventured underneath the roadway. His verdict? "No damage," he was quoted as saying by the Indiana Gazette. The comparison studies had resulted in an acceptable load analysis.

The load continued moving uneventfully across the Blacklick Creek Bridge, Coral Creek box culvert and Yellow Creek Bridge. Each structure behaved as predicted.

Finally, the load successfully reached its transfer point. It had taken the load 6 ½ hours to traverse the nine miles from Blairsville.

On May 5, the plant's Unit #3 was returned to service and the transformer was put to work supplying power to the tri-state area. It had taken a huge effort by this team of transportation specialists to make the move successful, but the benefits it reestablished for the public had been well worth it. ■

Traffic moving on the new westbound lanes, above the wall

From fossils to football traffic

Ben LaParne, P.E.

Lewistown Narrows project generates high level of public interest

From fossil finds to having to be sensitive to football traffic, the Route 22/322 Lewistown Narrows project (www.penndot2.com) is one of the largest and most interesting in the Commonwealth.

The 10-mile long Lewistown Narrows highway is being built in three sections, two of which are complete. The final section now under construction is the second largest project ever awarded by the Pennsylvania Department of Transportation (PennDOT). Only a portion of Route 202 in Montgomery County was larger, at a bid of $104.86 million versus $104.36 million.

The Lewistown Narrows isn't only important to create another modern four-lane link between Harrisburg and State College, but will provide the additional lanes and the needed shoulders on this narrow section of the 100 mile corridor. The official detour is nearly 70 miles long, making accidents and traffic jams in the Narrows, a special headache for all travelers.

Started in 2004 and to be completed in 2008, the final Narrows construction section is 75 percent complete. The new highway is a complex design that minimizes excavation, addresses flood problems and provides for stability in the talus slope that extends along much of this 6.5 mile portion of the roadway.

Rocky terrain is so crucial to the project's design and construction that the Narrows was kicked off with a "rock breaking" event, instead of the typical "ground breaking" ceremony.

Special efforts are made to avoid construction-related delays during peak weekday traffic travel times or special event traffic, such as fans headed to Penn State home football games, and to disseminate traffic information. In fact, each fall the project team has a media briefing to show infrequent Narrows travelers, like some football fans from Harrisburg or Lancaster, the progress of the project. The project team hopes that if travelers know what to expect, drivers may be less likely to rubberneck and delay traffic or rear-end the vehicle in front of them.

These construction changes were dramatic for travelers in the fall of 2006. About three miles of mechanically-stabilized-earth walls loomed as high as 25 feet above the lanes being used by traffic. One wall alone is two-miles long. These walls separate the lanes along the river, which will be the new eastbound lanes, from the westbound lanes that are elevated above the river-edge lanes.

There also is a special beauty in the project that cannot be seen while driving

"Narrows" continued p. 13

Fossils found in the "Narrows"

PennDOT Project Manager Chris Stotish being interviewed in front of the talus slope

"Narrows" continued p. 11

through. The excavation of the Narrows and the nearby Northern Lewistown Bypass project has revealed fascinating fossils, the remains of prehistoric organic material, such as scallops and coral that can be viewed on the Web site, www.penndot2.com. It's hard to imagine, but 400 million years ago the Narrows was an ancient sea that today is ridges of sandstone and valleys of limestone.

Construction in the Narrows goes on year-round. With 135,000 cubic yards of concrete to be used, which is equal to 12,000 truck loads of concrete, the project has its own on-site concrete plant to be as efficient as possible in getting the concrete to each pour site.

One eastbound lane and one westbound lane of traffic are maintained throughout the project. Traffic patterns shift as portions of highway are complete and construction focuses on another area. Currently, both east and westbound traffic are using newly-constructed westbound lanes through a portion of the project, and the focus has turned to building the permanent eastbound highway. Already, miles of walls along the Juniata River have been built to edge those lanes.

The total cost of all three Narrows sections is $134 million. More background and information, including traffic alerts, are on www.penndot2.com.

Walsh Construction is the primary contractor and Maguire Group, Inc. is providing construction management services for the PennDOT District 2-0 project. ■

This article was originally published in the special Engineer Week supplement of the Harrisburg, PA Patriot News newspaper on February 20, 2007. *Ben LaParne, P.E. is Assistant District Executive for Construction, PennDOT District 2-0.*

ASHE Derby City Section ...Out of the Gate

Dave Stills – President, ASHE Derby City Section

"They're at the Post ... and they're off!" The most famous horse race in America, the Kentucky Derby, is a race for three-year old thoroughbreds. It takes a lot of time and effort to breed and train a Derby winning horse, and almost just as much time and effort to start a new American Society of Highway Engineers section. Well ... maybe not as much as a Derby winner, but close.

The Derby City Section started to form in fall of 2005. It is safe to say that it did not begin as a sprint (short race, less than 1 mile), but more like a route (long race, greater than 1-1/8 miles). It began when a co-worker, who helped start a chapter in Nashville, Tennessee, encouraged Dave Stills, an engineer, to start a chapter in the Louisville area. Dave contacted Ed Nobles, a concrete pipe supplier and ASHE member from Ohio, who had recently relocated to Louisville. Ed explained the great benefits and networking opportunities available through the ASHE organization. After that initial meeting, David Jones, New Sections Director, was contacted and asked to come to Louisville for a "lunch 'n learn" to educate potential members. A date was set and the only hurdle, like getting out of the starting gate cleanly, was to compile a list of potential members.

Louisville is active with other professional organizations like ASCE and NSPE. Would members of these organizations be willing to join another? Especially one that most had probably never heard of. Dave began calling and e-mailing fellow engineers, government agencies, industry suppliers, contractors, and anyone willing to listen to a short discussion concerning ASHE. Within weeks, and with help from many others, a list of interested persons was compiled; the meeting was finally becoming reality.

Our first meeting was held on October 4, 2005 with 36 people in attendance. Guests ranged from engineers to contractors to suppliers to agency people; one of the main reasons ASHE is successful is diversity. David Jones informed the audience about the ASHE organization and helped generate great interest in a new section. Many were probably ready to join right then, but as with anything new, there needed to be more discussion and analyzing, something engineers apparently like to do too often. Several individuals at the meeting showed interest in becoming core members; another meeting was held December 14, 2005 with Dave Stills, Kyle Chism, David Lanham, Ed Nobles, Karl Sawyer, Kenan Stratman, Jeremy Kubac, Ben Robertson, Jeff McConahy, Shap Stiles, Tim Robinson, Greg Groves, and Paul Davis in attendance. We had a beginning of our group!

The group continued to call on potential members and meet periodically. The core members established another membership startup meeting for February 1, 2006. Caroline Duffy, TRIKO Valley Section member, graciously traveled from Cincinnati to Louisville and helped answer many questions from the interested crowd of approximately 45 people. The Section was gaining ground and after this meeting the whip finally starting to show some worth.

In less than a furlong our Section received 35 applications for membership. Membership continued to grow throughout the summer of 2006 and to maintain momentum, a luncheon was held on August 9, 2006 at Carrabba's. Although they are normally not open for lunch, they were happy to oblige when they heard we would bring 55 attendees. Dave Hardin (Gohmann Asphalt and Construction Company) and Rob Harris (KYTC District 5) were the featured speakers. They talked about the I-64 Weekend Shutdown project in Louisville.

This would be our final meeting before chartering. The great thing about the meeting, other than the wonderful turnout and great food, was that 21 of the attendees there were not members ... yet.

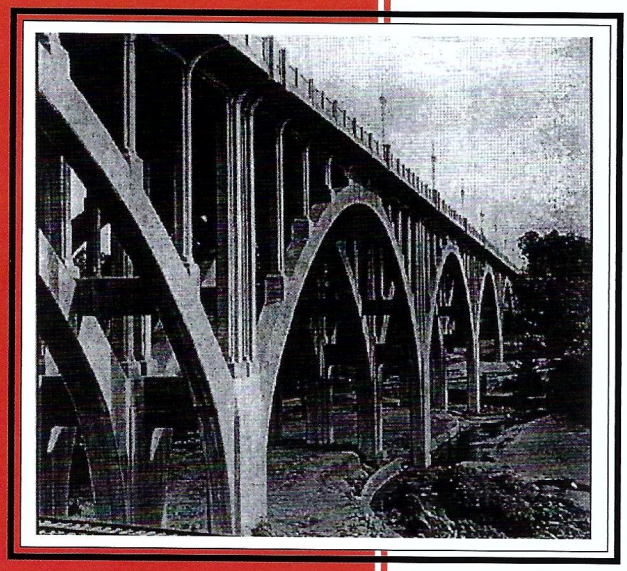
After the last luncheon and prior to chartering, the Derby City Section set up a booth during the KYTC/ACEC-KY/FHWA Partnering Workshop in Louisville from August 21 – 23, 2006 to attract more members and get our name out around the state. Several folks visited and requested membership applications; many have joined. Since we were just starting the Section, the Partnering Workshop committee graciously allowed us convention space at no charge. That's like finding a winning exacta ticket on the ground at Churchill Downs.

The Derby City Section Chartering Dinner was held October 4, 2006 (one year after our initial meeting) at Hurstbourne Country Club with J.M. "Mac" Yowell, former Kentucky State Highway Engineer, as our guest speaker. Mac talked about the importance of ASHE and the great strides the organization has made throughout the years. Mac also talked about how the transportation system is so vital to our communities and standard of living. It was an honor to have Mac Yowell as our guest speaker; he was presented a genuine Louisville Slugger baseball bat personalized with ASHE Derby City and his

"Derby City" continued p. 21

Fulton Road Bridge

Rick Green



Constructed between June 1930 and February 1932, the Fulton Road Bridge, designed by noted bridge engineer Wendell P. Brown, and built by the Hunkin-Conkey Construction Company, was unique by engineering standards. Spanning the Big Creek Valley in Cleveland, Ohio, it was one of only three known arch bridge designs in the nation that utilized the technology of flat slab construction over spandrel columns. The use of this technology was ground-breaking to the extent it gave the bridge uncharacteristic aesthetic features as compared to similar open spandrel concrete arches. The open, less confining sense of space that the Fulton Road Bridge exhibited, was indicative of the Streamline Moderne architectural style that was popular through the 1930's, and the practice has only recently been recognized as an important component of arch bridge construction.

Typical aesthetic bridge design of the period attempted to achieve efficient use of structural members with a pleasing agreement to the individual structural elements, when viewed from the side, or from an elevated standpoint. However, the Fulton Road Bridge design included features that unified the deck, spandrel columns, and piers into a more "streamlined" appearance. When viewed from below, this gave the bridge a less obstructed view of the flat slab underside, as well as the column capitals, to further emphasize the streamline theme.

In the 1980's, the deck was resurfaced and the original railings and sidewalk cantilevers were removed, and the vintage lampposts were replaced by more contemporary lighting. A new sidewalk was also added to the west side of the deck. The Fulton Road Bridge has been continuously open to traffic since 1932, and while periodic improvements and repairs have been made over the years, the original deck, substructure, and superstructure remain.

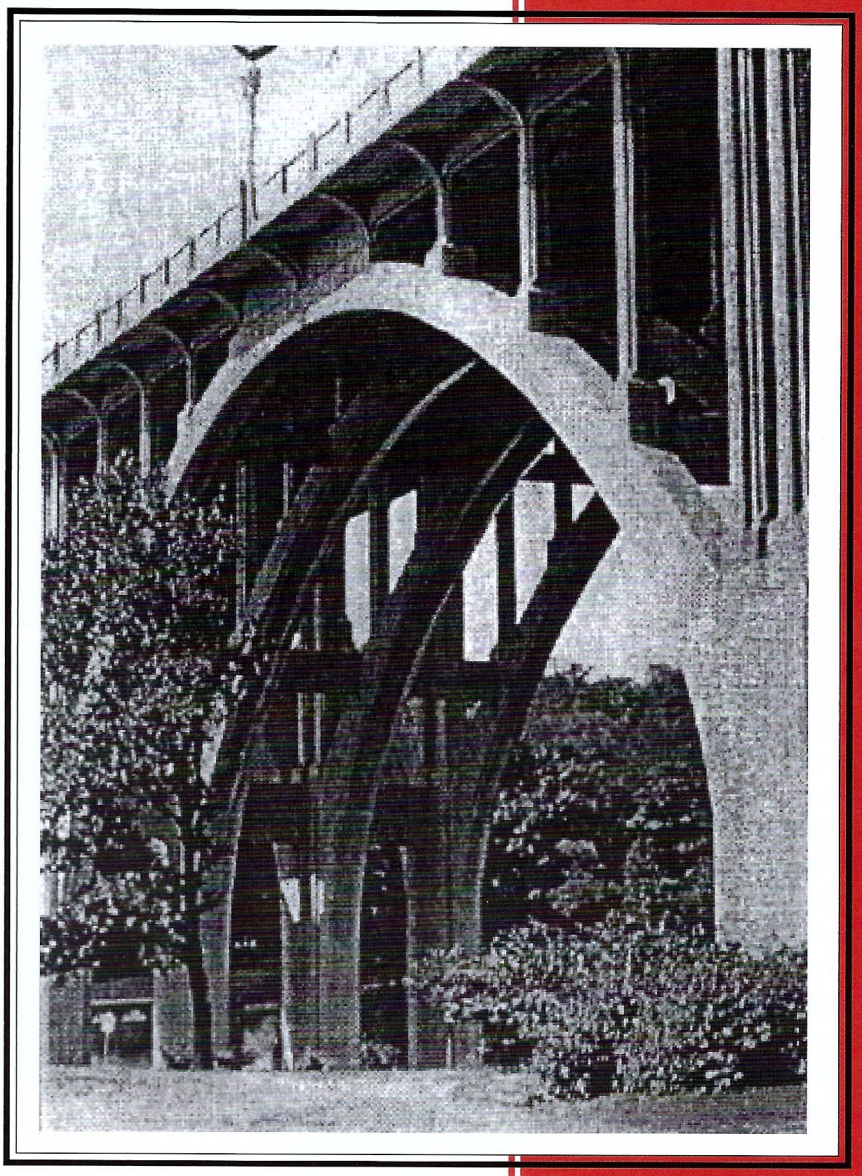
In the ensuing years since the sidewalk cantilevers were removed, salt water from snow and ice road treatments has run down the exterior of the spandrel arch columns and piers, causing advanced concrete deterioration to much of the exterior surfaces of the bridge. The deterioration and subsequent threat of falling concrete have become dangers to the public, since the bridge now spans a portion of the Cleveland MetroParks Zoo. Although safety measures were taken in 1997 by installing netting and metal protection "canopies," the extensive deterioration of the exterior components, the safety of the public, and the need to maintain harmony with the surrounding community aesthetically, became the determining factors in local officials deciding to build a new Fulton Road Bridge.

Public involvement meetings were held to disseminate information about the project, and to show graphics and images of bridge design alternatives. Once the public input was summarized by the design team, the results were then submitted to the Fulton Road Bridge Technical Advisory Committee (TAC). Made up of officials from the Cuyahoga County Engineer's Office, the City of Cleveland, Cleveland MetroParks Zoo, the Ohio Department of Transportation (ODOT), and the Federal Highway Adminstration (FHA), the TAC evaluated public comments in relation to the project evaluation criteria, which included aesthetics, construction impact, and future maintenance, among others.

This evaluation of the project criteria and consideration of the public sentiment led the TAC to select a Contemporary Concrete Arch design for the new Fulton Road Bridge.

This alternative preserves the structural form of the existing bridge, and provides a similar appearance. It also opens up the spandrel area between the arches and the deck, creating less of a visual barrier to patrons of the Cleveland MetroParks Zoo. Finally, with fewer structural components than the Traditional Concrete Arch design, the new Fulton Road Bridge is more conducive to a shorter construction schedule and will be more economical to inspect and maintain.

The Fulton Road Bridge is an institution in the Greater Cleveland area and has steadfastly served the community with stoic dignity for 75 years. However, time has diminished its structural integrity and visual appeal, and a new, improved version will be constructed to replace it. Hopefully, the new bridge will be a credit to its predecessor, and stand as a lasting monument to its strength and aesthetic beauty.



Fulton Rd. Bridge taken in 1932, shortly after completion

The new Fulton Road Bridge is scheduled for completion in the Fall of 2009. ■

Delaware Valley Projects of the Year

Robert M. Wright, P.E.
Vice President, Urban Engineers, Inc.
Member, Board of Directors, Delaware Valley Section

At its April 18, 2007 dinner meeting, the Delaware Valley Section cited its Projects of the Year for 2006. For the past three years, the Section's program has recognized efforts in two separate categories, defined by construction costs ("small" projects under $5 million, "large" $5 million and above). It was felt that this division would allow notable and significant, but smaller-magnitude, undertakings to be considered on an "even plane" with bigger ones. Consequently, this opened the competition to a larger number and variety of projects.

A total of three candidates were submitted for consideration, with two in the smaller category and one in the larger. After careful consideration, the Section's Project of the Year Committee selected the following to receive the 2006 award.

Delaware Valley ASHE 2006 Project of the Year (under $5M)

The award winner in the under $5 million class is SR 162, Section EMG, the emergency reconstruction and restoration of a historic stone arch bridge on Strasburg Road (SR 162) in West Bradford Township, Chester County, approximately 2 miles west of West Chester Borough. This structure carries Strasburg Road over Broad Run, an important tributary of the Brandywine Creek.

In summer 2003, heavy rains and flooding caused this bridge to collapse. Traffic volumes and recent residential development in this once-rural community, coupled with a lengthy detour on adjacent, busy two-lane roads, dictated that the bridge had to be repaired or replaced, and Strasburg Road reopened to traffic as expeditiously as possible.

However, restoration of the bridge proved to be a complicated task. A number of factors played major roles in the design and completion of the project. Contributing to the complexity was the classification of Broad Run as an environmentally protected Exceptional Value watershed. As such, this stream also supports a population of brown trout, whose spawning needs and sensitivity to sediment had to be considered. Additionally, the bridge is adjacent to a prime bog turtle habitat, and the first bog turtle found in District 6 was discovered at this location during project investigations.

The historic nature of the structure, and the need to replicate its aesthetic qualities, had to be taken into consideration as well in design, and environmental/historic aspects had to be addressed before design and construction funding could be programmed. Coupled with these, the nature of the work as an emergency project made the rebuilding critical and cost efficiency was an additional high priority. A precast concrete arch section was selected to allow construction to proceed expeditiously and permit the replication of the bridge's aesthetic quality.

SR 162, Section EMG - Delaware Valley ASHE 2006 Project of the Year (Under $5M)

Project design for this project was undertaken in fall 2003 on a fast track. Construction was completed in November 2005. A cold snap prevented final paving, but some unexpected warm weather presented a "window", and the bridge roadway was paved and opened by January 2006.

Design was performed by Urban Engineers, Inc., and the construction contractor was McMinn's Asphalt Company. The structure is owned by PennDOT and the project was administered by Engineering District 6-0 in King of Prussia. The total cost of the project was $1.15 million.

Thanks to these project partners, the effort was successfully implemented. Residents of West Bradford Township and the surrounding Chester County community have a piece of their rich history back, providing its daily function for traffic. With careful planning and minimal disruption during construction, wildlife near the site is thriving as well.

Delaware Valley ASHE 2006 Project of the Year (above $5M)

The award winner for the $5 million and above category is SR 413, Section 005, the reconstruction and minor widening of New Rodgers Road in Bristol Township, Bucks County.

Over the years, the population in Bucks County has risen significantly. The eastern segment of the county has been one of the fastest growing areas in suburban Philadelphia. The combined population and development changes have resulted in the need for a major upgrade of the many roadways and intersections in the County. The two-lane facilities that adequately served the area in the past, when it was more rural, must be improved to accommodate present-day and projected traffic needs.

One of the roads in need of such an improvement was SR 413, also known as New Rodgers Road. This artery serves as a critical east-west route across the county and also links I-95, US 1, US 13 and the Burlington-Bristol Bridge to and from New Jersey. As on many suburban routes, traffic volumes have steadily increased both for through movements as well as localized trips to and from many commercial establishments and developments along its frontage.

Among the solutions proposed, analyzed, and eventually implemented under this project are the additions of a jughandle at one intersection, the modernization of traffic signals, the construction of a new ramp to I-95 that had been previously proposed but never built, and the installation of a new underground pumping station to handle stormwater. Aesthetically, the corridor was vastly improved through a beautification and landscaping program that was part of the overall project.

As a result of this $24.4 million undertaking, congestion along the SR 413 corridor was reduced and the level of service on the most troublesome 2-mile segment of the highway was enhanced.

Construction of this long-awaited project began in August 2000, with several work orders issued in 2002 that expanded the scope slightly. The effort was completed in December 2002, with the last of the beautification elements completed in fall 2006.

The project was designed by Pickering Corts & Summerson, and James D. Morrissey Inc. was the construction contractor. SR 413 is maintained and managed by PennDOT and the project was administered by Engineering District 6-0 in King of Prussia.

Thanks to this effort, traffic in this part of Bucks County is moving more efficiently and safely, and New Rodgers Road is able to accommodate the varied needs of its users.

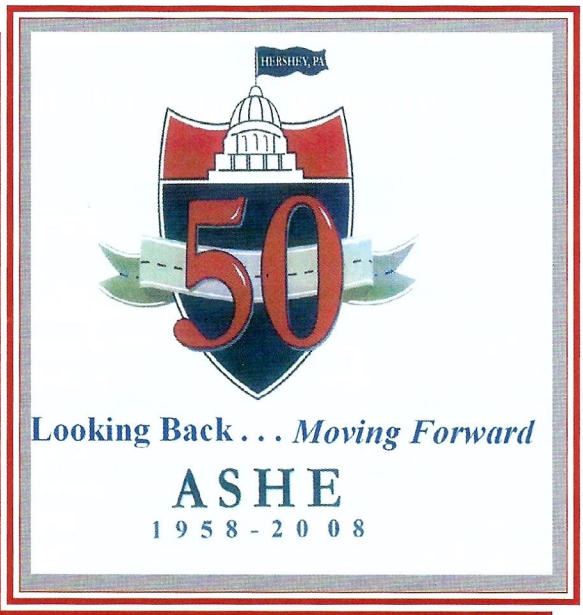
Stephanie Butler, Chair of the Section's Project of the Year Committee and Member of the Section's Board of Directors, expressed her pleasure with the caliber of submissions and the results. "Since we moved to recognize projects in the two categories, we can better address those smaller efforts that are typically overshadowed by projects that have greater impacts, profiles and costs. This is especially important when the smaller projects allow opportunities for unique or unusual solutions that can get implemented in a more efficient manner," she observed. Jeff Obrecht, 2006-07 Section President, noted, "The winning projects highlight the ways that engineers and contractors work together to overcome constraints and employ effective methods to deliver needed projects."

The Delaware Valley Section extends its thanks to all the award applicants for their participation. As always, the Section continues to look forward to the recognition of projects within our area next year. ■

SR 413, Section 005 - Delaware Valley ASHE 2006 Project of the Year (Over $5M)

Celebrating 50 Years of Progress

ASHE National Conference June 11 – 15, 2008 Hershey, PA



The 2008 ASHE Conference will be held at the Hershey Lodge and Convention Center in Hershey, PA. The Hershey Lodge and Convention Center is uniquely Hershey, with special tastes and touches that will never let you forget you are in "The Sweetest Place on Earth." The Hershey Lodge offers guest rooms and suites with regionally crafted furnishings and local artwork in addition to three swimming pools; health and fitness center; basketball, tennis, and volleyball courts; 18-hold miniature golf course on site; varied dining options; and a recreational department that offers chocolate-themed activities. The Hershey Lodge is located a short distance from the many Hershey attractions including Hershey Park, Hershey's Chocolate World, Hershey Hotel, Hershey Gardens, Hershey Museum, and the Hershey Country Club. See the Hershey website www.hersheypa.com.

ENTERTAINMENT

On Thursday evening, join us at the "Remember When?" icebreaker reception. Do you remember those warm summer nights going to the carnival with your family and playing games, eating cotton candy, popcorn and snow cones, and seeing the carnival entertainers?

Our Friday evening event takes us to the Pennsylvania Auto Museum where you can "Cruise Through Time" touring the Auto Museum, getting your picture taken in a vintage car with a famous movie star, and dancing to the sounds of the Greaseband.

Saturday night's "Red Carpet Revue" is sure to be the highlight of your trip to Hershey. Joan Rivers will be greeting you on the Red Carpet with an interview of the stars and the Kenny i Orchestra will be entertaining.

TECHNICAL PROGRAM

50 YEARS OF THE AMERICAN HIGHWAY SYSTEM

Transportation Legislatively Speaking

The discussion topic will be 50 years of transportation legislation and funding reforms. The purpose of this session is to demonstrate how the legislative funding mechanisms have changed over the years and to discuss what challenges the future holds for funding sources.

Highway Driving/Industry Driven

This topic will be presented from an historical perspective, initially focusing on industries such as coal, steel, and concrete. The discussion will initiate with the influence industry had on the development of roads and will continue to show how the perspective has changed such that roadway development influences industrial development. Discussions will also include aesthetic and design considerations as well as the trucking and railroad industry and their impact on the roadway system.

Technical Project and Tour

A technical presentation and tour of a major roadway construction project is also being conducted. Although the project being discussed is a very large and complicated project, it also fits into the theme of the history of the roadway system very well. The purpose of the project is to widen and rehabilitate a major travel way in the area as a result of increased traffic volumes and economic development in the area.

"President" continued from p. 5

for ourselves, but we are growing because of what we are all doing. I asked you to tell a friend about ASHE and bring them to a Section meeting. Well, it's working! Our efforts are paying off. I have chartered 2 new Sections and our existing ASHE Sections are gaining new members. I am confident that we will continue to grow because of our cooperative efforts.

It has been an honor to serve the ASHE organization and the highway industry. Perry Schweiss is your incoming National President. He is an active member in the Southwest Section and in Region 3. At the National level, he chairs the Constitution and By-Laws Committee, and has served on both the Strategic Plan and Budget/Audit Committees. Perry has been an important member of the Executive Committee and of the National Board. I know that the American Society of Highway Engineers will be in good hands, when I pass the gavel to Perry at our 2007 National Conference. ■

Respectively Submitted by
Richard S. Prentice, National President

"Derby City" continued from p. 15

name. The Section chartered that night with 62 members. We now stand at 68 members.

The Derby City Section has a long way to go to reach membership and achievements of Sections that have paved the way before us. The Derby City Section is grateful to all the ASHE members from other Sections and National who have encouraged and helped us get to where we are today. The race is still going and, figuratively speaking, we are only in the back stretch, but like any great Kentucky thoroughbred, we are now starting to get our legs and have only just begun to run. ■

GOLF OUTING

The 2008 ASHE National Conference Golf Outing will be held on Thursday, June 12, 2008, at the Hershey Country Club on its two championship golf courses – the West and East Courses.

LOCAL ATTRACTIONS

Hershey, PA:
Visit Hershey Park, Hershey Gardens, and Hershey's Chocolate World.
http://www.hersheypa.com

Harrisburg, PA:
Visit Pennsylvania's State Capitol. Attractions include the State Capitol, State Museum, Whitaker Science Center, City Island, and the Civil War Museum.

Lancaster, PA:
America's oldest Amish Community. Visit beautiful farms, quaint towns, and antique stores. Home of the historic Strasburg Railroad.
http://www.padutchcountry.com

Gettysburg, PA:
Visit the historic Civil War site and home of the Gettysburg Address.
http://www.gettysburgcvb.org

Mark Your Calendar!

ASHE National Conference
June 11 – 15, 2008
Hershey, PA

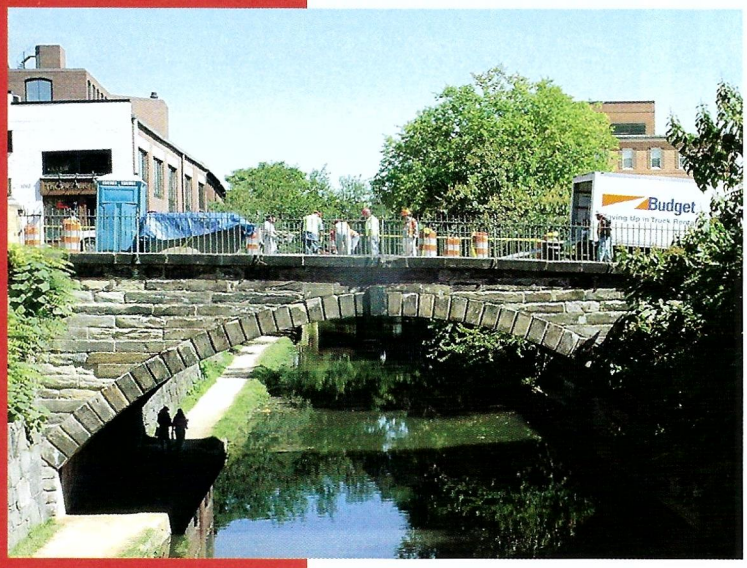


Fig. 1

Strengthening Masonry Arch Bridges

Ronald H. Bane

Following inspection and structural load rating analysis, the historic Wisconsin Ave. Bridge (Fig. 1) located in the Georgetown area of Washington, DC, was found to be inadequate to support vehicle loads at the minimum HS 20 rating required by AASHTO (American Association of State Highway and Transportation Officials). Accommodating heavy traffic in an intensely commercial area as well as preserving the oldest historical bridge in the country was the challenge faced by several public organizations.

A joint collaboration of transportation officials from the Federal Highway Administration, the Eastern Federal Lands Highway Division, the District Department of Transportation and the National Park Service was formed to overcome this challenge.

Fig. 3

Typically, when a masonry arch bridge is in need of repair or is determined to have less than the required AASHTO rating, it is demolished and replaced with a concrete or steel structure. Therefore, there are a diminishing number of such masonry structures remaining in the United States.

During the investigation process, officials learned of a bridge strengthening system that would accomplish the objective of raising the load rating, as well as preserving the structure in its original condition. The system they discovered is provided by Cintec America, Inc., headquartered in Baltimore, MD. At the present time, Cintec has installed its reinforcing system in approximately 200 bridges throughout the world.

The Cintec system allowed stainless steel structural reinforcement members to be imbedded entirely within the arch structure without altering the visible appearance of the bridge, and equally important, installation work was performed in one lane at a time, allowing the bridge to remain open throughout the entire process.

During the design phase, a three-dimensional simulation model of the bridge was created using a computer aided design program. Live loads were simulated and reinforcement configurations were matched to the requirements until an optimal, final design layout was achieved. Construction drawings were prepared and installation began in September 2004.

Construction documents in Figure 2 prepared by a structural engineer show the configuration of all stainless steel reinforcing members.

Installation proceeded as follows: Holes to accept the stainless steel anchors were drilled into the arch. The anchor bars for this project were Type 304 grade stainless steel, 1" in diameter, and the holes were 2 1/2" in diameter. (In all bridges, the hole size is

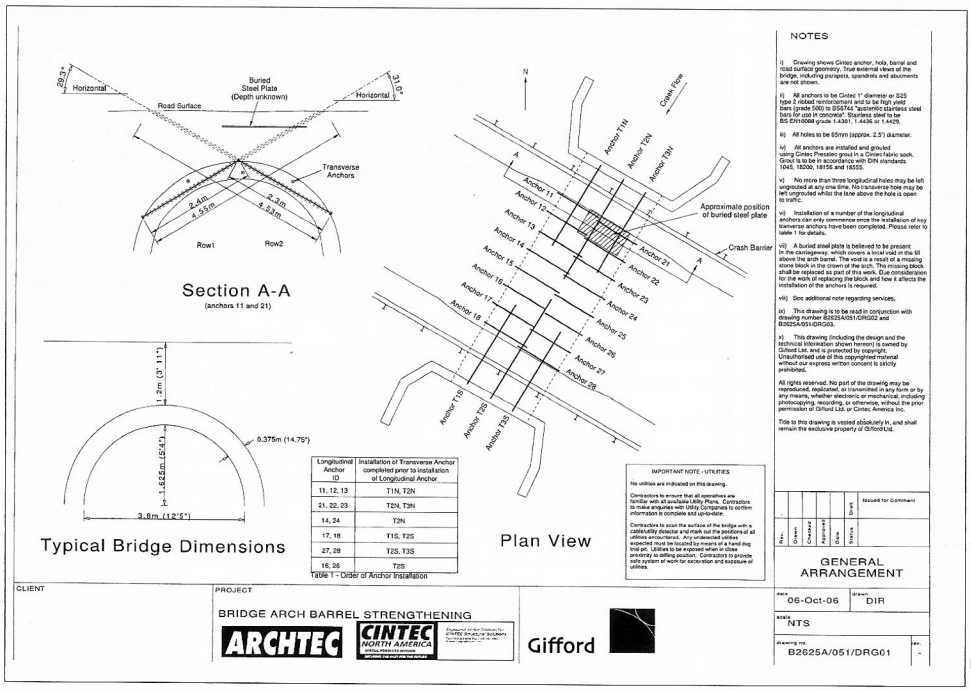


Fig. 2

approximately double the bar size.) The angles at which the holes were drilled were precisely calculated according to the geometry of the bridge and were drilled to a tolerance of +/- 0.10 degree. All drilling was non-percussive, slow speed, high torque, which eliminated any vibration that could potentially cause damage to the bridge.

Anchors enclosed in a polyester sock material were then inserted into the holes. Twenty-six reinforcing anchors were required for this project.

Cementitious grout (sympathetic to the bridge material) was pumped into the sock, causing it to inflate and encase the steel in 5,800 psi compression grout. The purpose of the sock is to control the grout flow and insure that it stays within the drilled holes. Pumping uncontrolled grout or other materials into a masonry arch could cause damage to the bridge and the environment.

Over long periods of time, rainwater creates voids and spaces within the fill of all masonry bridges. On the other hand, the bonding strength of the anchor is calculated based on total contact between the grout and the substrate material. It is clear that the flexible sock is imperative to ensure that the grout shapes itself to all irregularities within the arch, thereby ensuring maximum mechanical and chemical bonding strength of the embedded anchor.

The entire installation process took place from the surface of the bridge roadway and did not require any excavation or relocation of any utilities. The bridge contained water and gas lines, electrical power cables, sanitary sewers, and storm water drains; as seen in Figure 3, traffic flowed uninterrupted during the entire construction phase.

The Cintec system required substantially less construction time than other methods of bridge strengthening, and had minimal impact on local traffic. In fact, the Wisconsin Ave. project took a total construction time of approximately two weeks. The cost of the project was $350,000 excluding design costs. This price was a fraction of the cost of bridge replacement, even before considering the significant economic impact on the community if the bridge had to be closed.

After installation was complete, the only visible evidence of the installation was a small amount of grout on the road surface. In essence, the Cintec system allowed installation of a complete structural steel reinforcement system into an arch bridge with virtually no effect on the appearance of the bridge.

The Cintec system offered a cost effective option for strengthening historic bridges and allowed the structural engineer to address historic preservation regulations while also satisfying bridge codes, safety and environmental requirements.

Prior to the project, the Wisconsin Ave. Bridge's load rating was posted at 25 tons. After completion, the rating was increased to HS 25 or 45 tons.

Another strengthening design that might have been chosen to upgrade the Wisconsin Ave. bridge was to completely remove the fill and install a new reinforced concrete saddle over the existing masonry arch. Following is an overview of the tasks required with that alternative:

CINTEC SYSTEM

1. Drill (26) 2 ½" holes.
2. Insert (26) Cintec anchors.

Job complete! Construction time 2 weeks.

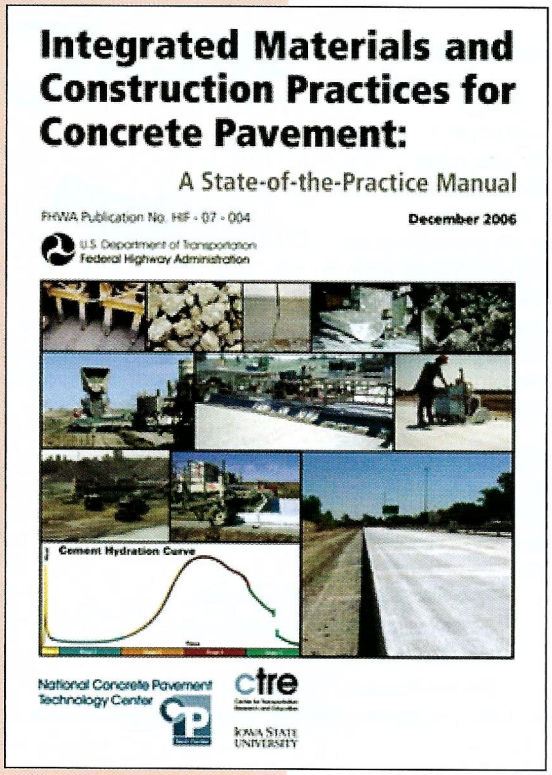
CONCRETE SADDLE METHOD

1. Close bridge. (Not required with Cintec)
2. Install centring. (Not required with Cintec)
3. Break up macadam and dispose. (Not required with Cintec)
4. Excavate the fill. (Not required with Cintec)
5. Dispose of fill. (Not required with Cintec)
6. Destroy historic elements of bridge. (Will not happen with Cintec)
7. Build concrete arch. (Not required with Cintec)
8. Refill bridge. (Not required with Cintec)
9. Repave bridge. (Not required with Cintec)

Job complete! Construction time approximately 4 months!

As seen in this example, the Cintec system will increase the structural capacity of an arch bridge while not reducing structural clearances or affecting the appearance of the bridge. Reinforcement can be installed quite quickly with minimal disruption to bridge users compared to other conventional techniques. ■

Ronald H. Bane is an engineer with Cintec America, Inc. He has a B.S. Degree in Civil Engineering from Johns Hopkins University.



Chapter 1	**Introduction:** purpose and organization of the manual, principles of concrete pavements, and optimization of concrete for pavements.
Chapter 2	**Basics of Concrete Pavement Design:** how concrete pavement design interacts with materials and construction requirements.
Chapter 3	**Fundamentals of Materials Used for Concrete Pavements:** the ingredients that we have to work with, and how they influence concrete performance
Chapter 4	**Transformation of Concrete from Plastic to Solid:** how cement chemistry and the cement's physical changes during hydration are central to good-quality concrete, and how supplementary cementitious materials and chemical admixtures affect the hydration process.
Chapter 5	**Critical Properties of Concrete:** fresh and hardened properties of concrete that correlate with concrete performance.
Chapter 6	**Development of Concrete Mixtures:** how to achieve the required performance with the materials that we have.
Chapter 7	**Preparation for Concrete Placement:** how the Subgrade and base influence the concrete.
Chapter 8	**Construction:** how construction activities and workmanship influence the concrete, what tools are available and the current best practices to ensure high-quality pavement.
Chapter 9	**Quality and Testing:** a brief discussion of quality systems, and description of some of the test methods that can be used to monitor concrete performance.
Chapter 10	**Troubleshooting and Prevention:** identifying the problem and the fix when something goes wrong, and preventing recurrence.

Integrated Materials and Construction Practices for Concrete Pavements

Dale Harrington, P.E., and Jim Grove, P.E.

Pavement design and construction procedures are changing. More ingredients (like supplementary cementitious materials and chemical admixtures) have been introduced to the concrete mix. New testing procedures have been developed. Equipment and placement techniques have changed. All of these processes, however, are handled by specialists focused on their respective area of expertise. Although the need for specialization has been necessitated by today's complex road building environment, it has not eliminated the need for every individual involved in any stage of a project to understand concrete pavements as integrated systems and pavement construction as an integrated process.

With this challenge, the National Concrete Pavement Technology Center (NCPTC) has developed a 350-page state-of-the-practice manual, which is the result of a four-year project sponsored by the Federal Highway Administration (FHWA). The primary goal of the manual is to provide a resource that will help users understand the integrated nature of concrete pavement materials and construction practices and apply that understanding to the design and construction of concrete pavements. This resource will help agencies, consultants, and contractors learn about and apply new technologies. It describes how and why to implement concrete tests, performance prediction methods, and new practices that, when more widely used will optimize materials selection, mix design, and construction practices. It describes how as well as why to implement these technologies, and provides a troubleshooting matrix.

The manual reflects the contributions of several authors across the country with a review by numerous recognized content experts. "Distribution of this manual commenced earlier this year, and it has proven to be a highly popular manual" said John M. Becker, P.E., of the American Concrete Pavement Association, Pennsylvania Chapter and member of the ASHE Harrisburg Section. "It is one of the best concrete pavement technical documents developed in years". A limited number of copies can be obtained through your local concrete paving state/chapter association or through the American Concrete Pavement Association at www.pavement.com. A second printing is already being planned, and the entire manual can be accessed at www.cptechcenter.org. ■

By Dale Harrington, P.E., Snyder & Associates representing the National Concrete Pavement Technology Center at Iowa State University, and Jim Grove, P.E., National Concrete Pavement Technology Center.

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Profile

The *SCANNER* is published quarterly by the American Society of Highway Engineers and delivered to over 6,008 readers nationwide.

- 16% are State D.O.T. Employees
- 66% are Engineering Consultants
- 9% are Contractors
- 9% are Related Professions
- 50% of the membership have a professional status

***SCANNER* Correspondence**

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As the Wheel Turns

Section Treasurer Receives ASHE Altoona Distinguished Service Award

G. Edward Stoltz, P.E. has contributed to and supported the transportation industry throughout the past 33 years. Ed is the Design Services Engineer in District 9-0. In this role, he is the Manager of the Survey, Right of Way, Environmental, Pavement Design and Utility Relocation Unit. PENNDOT has had a large and growing construction program over the past few years, and Ed has been a key factor to getting these projects out the door.

Ed has also acted as a liaison for local projects, including Hollidaysburg Streetscape, Altoona Railroaders Museum, and numerous other projects. His leadership has guided many local sponsors through the design and lettings.

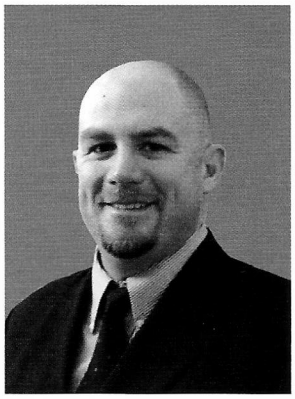
Ed has established himself in the Department and is known for his intelligence, calm demeanor, and ability to get past the problems to the solutions. He has great relationships throughout the industry. His relationships have helped us get through funding issues, find funds for local projects and made him well respected in the industry.

Ed is also very active in various charitable organizations, and has been the Co-Chairperson, Secretary and Treasurer of the PENNDOT District 9 Relay for Life Committee, all at the same time, since its inception. Ed keeps us all organized, keeps the books straight, volunteers whenever he can, drives the beer cart, gets the soda and multiple other tasks in the fight against cancer.

Last but not least, Ed is an organizer, promoter and officer in our ASHE Altoona Section. Ed has been a member since May 1985, and served as section president 1992-1993. He has voluntarily served as Treasurer over the last few years.

In summary, we would like to thank Ed for his contributions to our industry!

William P. McGarrigel, P. E. promoted at Urban Engineers, Inc.



(Pennsauken, N.J., March 12, 2007): Joseph P. McAtee, P.E., executive vice president, has named **William P. McGarrigel, P.E.** to the position of vice president and office manager of the firm's full service Pennsauken, New Jersey office.

McGarrigel has 14 years of professional engineering experience in the management and design of complex transportation projects. He has served as project manager and project engineer for the preliminary and final design phases of varying roadway projects in New Jersey and Pennsylvania for such clients as the New Jersey and Pennsylvania Departments of Transportation and the Pennsylvania Turnpike Commission.

A registered professional engineer in New Jersey and Pennsylvania, McGarrigel joined Urban in 1995. He is a 1991 graduate of the Pennsylvania State University with a bachelor of science degree in civil engineering and a member of the American Society of Highway Engineers. ■

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First State	143
New York Metro	138
North Central New Jersey	127
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Georgia	429
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Government	14%
Consultant	66%
Contractor	7%
Other	13%