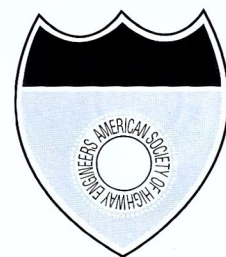


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**Summer 2004-3**

## Woodrow Wilson Bridge Project

### Taking Shape Through Advancing Construction

Seeing is believing and nearly four years into construction, the long-awaited Woodrow Wilson Bridge Replacement and Interchange Reconstruction Project is visibly taking shape. With critical preparatory and foundations work completed and more noticeable above-river and roadway work in full swing, construction of the \$2.43 billion project is more than a quarter completed and on track to provide safer and more efficient travel for some 70 million bridge travelers each year.

Careful and strategic management by Maryland, Virginia, District of Columbia and U.S. Departments of Transportation, complemented by the good works of a large cast of contractors, is paying off with a project that is on schedule and under budget. To date, there are 30 separate construction contracts, valued at more than \$1 billion, completed or underway. Of these 30 contracts, 26 have come in under initial engineering estimates - saving millions of dollars. Construction activity will further accelerate in the months ahead, as an additional 15 contracts (comprising more than \$400 million in estimated value) are bid and awarded.

Coordinating the massive project in a budget- and schedule-driven manner is essential because many of the contractors must work concurrently to meet key milestones that will enable the sequenced transfer of traffic onto the new crossing. The schedule calls for the southern span (Outer Loop) of the new crossing to open by mid 2006, at which time traffic will be switched onto the new six-lane bridge (three lanes in each direction) so that the old bridge can be torn down. Two years later, the northern span (Inner Loop) is slated for opening.

*"Wilson Bridge" continued p. 22*



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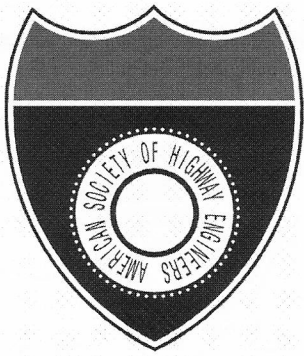
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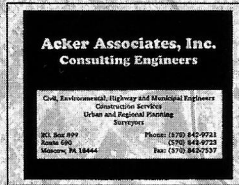






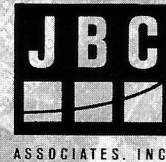
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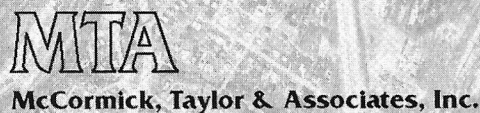
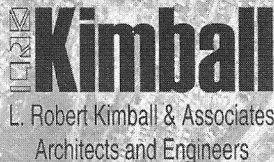
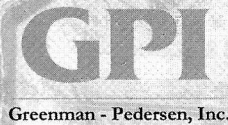


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# President's Message

Rodney P. Pello, P.E.

As I begin my term of office as National President of ASHE for 2004/2005 let me first thank all of you, the members, for the confidence you have expressed in me by electing me to this prestigious position. I am sincerely honored and will do my utmost to represent ASHE and all of you with the respect deserved.

I would also like to thank and commend David Jones, Immediate Past President, for a job very well done this past year. Last year the National Board adopted a renewed Strategic Plan for ASHE and David made great strides in moving us in the direction dictated by that Plan. It is now my challenge to keep up the momentum during the coming year.

The Strategic Plan is an excellent road map for where the National Board believes ASHE should be heading. I strongly urge all of you to continually refer to that document for we need the help of all our members if we are to achieve the goals and objectives outlined therein.

In the coming year my goal is to build on what has already been started, always with the Strategic Plan in mind. My hope is that we will, together, over the next year elevate the stature and image of ASHE throughout all of our Sections and Regions and in new areas as we reach out to expand.

Growth will be a key goal this year. The New York Metro Section will be chartered with over 80 new members on September 28, 2005 in New York City. This is no small accomplishment. This places ASHE in a mega market in the Northeast and will, I am confident, open the dialogue for further expansion within the New York area and perhaps even to New England. At this moment interest in new Sections is also being explored in Tennessee, West Virginia and Kentucky.

Chartering a new Section is more than a one-year effort. It takes a personal commitment of the members of the National New Sections Committee to make it happen. In order to capture the interest and maintain the enthusiasm for a potential new Section, the National Board has restructured the New Sections Committee, as they are the individuals charged with the challenge of expanding ASHE. Maintaining continuity within this committee from year to year is essential to increasing our successes. To that end David Jones has accepted the position as standing Chair to establish the continuity and long-term plan of the New Sections Committee.

Elevating the image and stature of ASHE will not happen through expansion and growth alone. We the members and the National Board must also communicate to those less knowing of us about what ASHE represents and about our core values and mission. ASHE should be and will be a nationally recognized forum for discussion and education related to the vital importance of maintaining quality in our transportation systems.

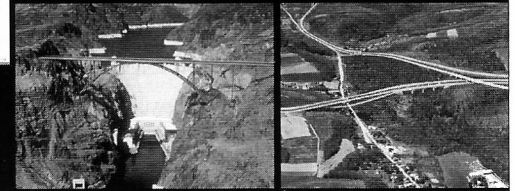
The National Board will rely heavily on the National P/R Committee to develop a long-term plan that will serve to bring the message of ASHE to those areas where we already flourish, to new markets, to the key transportation industry decision makers in both the public and private sectors and to the legislative leaders. This effort, too, will require long-term continuity within the P/R

Committee, as these goals will need to be achieved over time. Sandra Ivory, Past National President, has accepted the position as standing Chair of the P/R Committee. As a long-standing member and officer of ASHE Sandy knows very well what our message must be and how to spread the word.

Lastly, as we look to fulfill the objectives of our Strategic Plan so, too, we must re-examine our governing documents, the National Constitution and By-Laws, to assure that our core principles are preserved and properly stated as we move forward. The National Board will be taking a fresh look at those documents in October at a special workshop. Recommendations from that meeting will require feedback and approval from the members of ASHE. Your participation and support in this effort will be extremely important. We will be reaching out to all of you at that time.

The coming year will be busy and challenging - but one I look forward to. The strength of ASHE is in each of you, the members. I am confident, with your help, ASHE will continue to grow with the respect of all in the transportation industry. ■

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# FLORIDA FANTASTIC!

## ASHE 2004 National Conference

Ponte Vedra Beach, Florida

From June 16th to 20th the luxurious world class Sawgrass Marriott Resort & Beach Club was home to the ASHE 2004 National Conference. With something for everyone the resort and National Conference activities focused on providing fun, relaxation, and a memorable experience. What was your favorite? Was it the beach, golf, fishing, technical programs, entertainment, food, or just the opportunity to get away from it all and relax? In true Southern hospitality fashion, ASHE Region 9 extends our sincere gratitude for your attendance.

After weeks of record rains, the Sunshine State shined with perfect conference weather. The North East Florida ASHE Section kicked-off everything with Wednesday's "Super Bowl" Lunch Meeting that highlighted planning for Super Bowl XXXIX to be held February 6, 2005 in Jacksonville.

And for the golfers, attention then turned towards Wednesday afternoon's "Golf Academy Live" conducted by David G. Cook, PGA Professional. The Icebreaker Social was held in the resort's Tournament Hall exhibit area providing a great time for socializing, renewing old acquaintances, and making new friends. "Dessert served" closed out the evening.

On Thursday, the challenge of the TPC at Sawgrass Stadium Course and its picturesque 17th Island Green enticed veterans and rookie golfers alike. For many, this was a once in a lifetime opportunity to "Play where the pros play".

For the non-golfers, Thursday's agenda included a tour of FDOT's I-95/I-295 Interchange Construction Project, an

Historical Tour of St. Augustine, and exploring Florida's natural side with hiking and kayaking in the Guana River State Park. And if you think Emeril is good - those attending The Taste of Florida Cooking Demonstration will agree that it was right up there with anything seen on the Food Network - Hmm, Hmm Good!

Varied Technical Programs on Thursday and Friday presented current "hot" issues from local, state, and federal perspectives. Word of mouth says that the Traffic Calming presentation was greatly informative and fun too!

After a full day of activities, Thursday evening's Poolside Dinner and the music of a steel drum band provided a time of relaxation to further the discussion of golf bragging rights. It was apparent that the challenge of the Stadium Course had taken its toll.

The Pittsburgh Section once again received the conference attendance award at Friday's Opening Session. The day's activities offered concurrent Technical Programs and additional opportunities to visit Guana River State Park. Marineland, Florida's original theme park, provided an alternative to Friday's Technical Sessions.

Florida's own, and past FDOT Secretary of Transportation, Mr. Tom Barry was honored as ASHE Person of the Year at the Past Presidents' Luncheon. Tom lived up to his socks optional reputation by accepting the award in shoeless attire.

### Message from the 2004 National Conference Chairman

On Thursday evening of the National Conference, word reached us that Past National President Cooper Curtis was in an Orlando hospital and the prognosis was not good. The gravity of the situation was unexpected.

Thursday night was a pensive time as I prepared to possibly announce to the conference the passing of a great and fine individual. Immediately prior to Friday's Opening Session I was able to reach by telephone Cooper's hospital room and speak with his son. The prognosis was confirmed with the remaining time unknown.

Friday's Opening Session was bittersweet - conference planning coming to fruition but the Founding Father of ASHE in Florida conspicuously

absent. Varying from a normal agenda I took time to remember Cooper, hopefully, without overshadowing the joy and fun of conference activities. For their indulgence, my appreciation is extended to those in attendance.

Cooper Curtis passed away the following Tuesday at his home in Orlando.

It is with great pride and respect that I can say Cooper was a role model, mentor, and friend. And I am sure that many others share this thought.

Cooper Curtis is the reason ASHE is in Florida and the reason that we in Florida are ASHE.

Thank you,  
William J. Warden



The Construction Zone Dinner capped off Friday's activities. Coats and ties were checked at the door with hard hats in abundance as all signs pointed you to enter the construction zone. The "Sensations" band provided the music for an evening of good food, fun and dance. Surely one of the most memorable events of the conference - the crowd went home only after the music stopped.

After several full days of activities, Saturday provided a time for relaxation on the beach, by the pool, or deep sea fishing. The world-famous Alligator Farm provided the focus for the day's trip to St. Augustine.

Saturday evening was the highlight of the conference. Socializing with ASHE leadership at the Presidents' Reception and the arrival of National President David Jones by horse and carriage was followed by a trumpeters' formal invitation for fine dining. As guests entered the elegantly decorated "Havana Nightclub" themed ballroom, ASHE's 2003/2004 National Officers and Directors were formally announced. Fine dining

was followed with the ceremonial National Officer installation and remarks from National President David Jones and incoming National President Rod Pello.

As a formal ending to the conference, ASHE Region 9 offered greetings and handshakes in a symbolic passing of the baton to the ASHE 2005 "Pittsburgh" National Conference. Then the fun began with the "Calientes" providing the Latin beat for one last celebration of ASHE 2004.

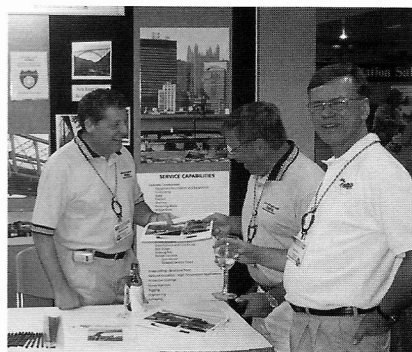
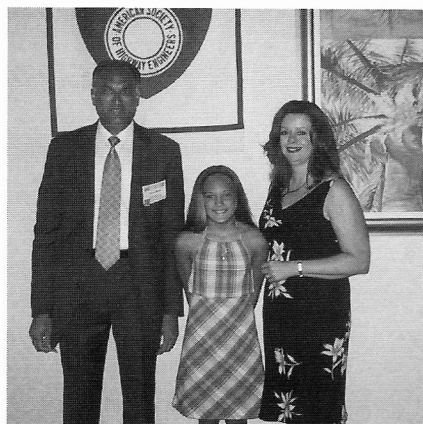
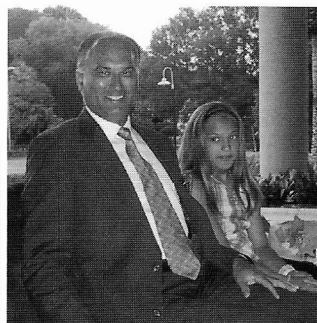
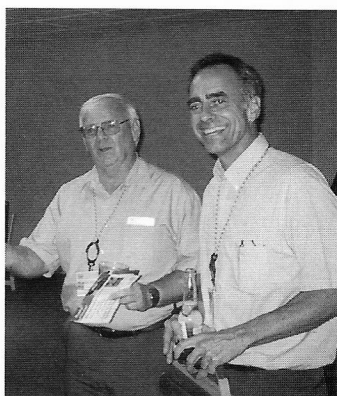
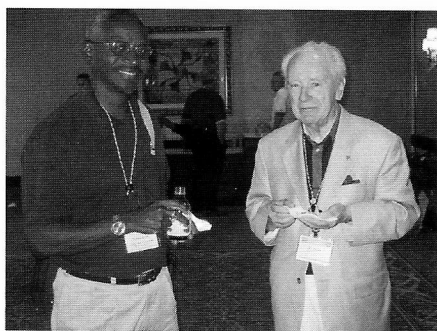
ASHE Region 9 Sections - Central Florida, Tampa Bay, North East Florida, Gold Coast, North Florida - extend our sincere appreciation to all the sponsors, advertisers, and exhibitors that contributed to the success of the conference. To conference attendees, it was our desire to provide a quality and memorable experience. We hope your visit to Florida's First Coast was enjoyable and that there are many good memories of the ASHE 2004 National Conference.

The following pages offer an assortment of snapshots in time from the conference in Florida. ■

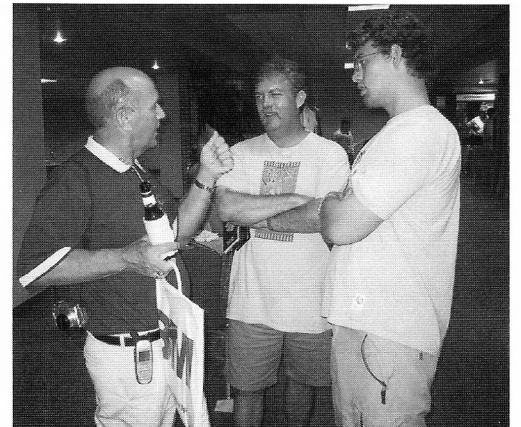
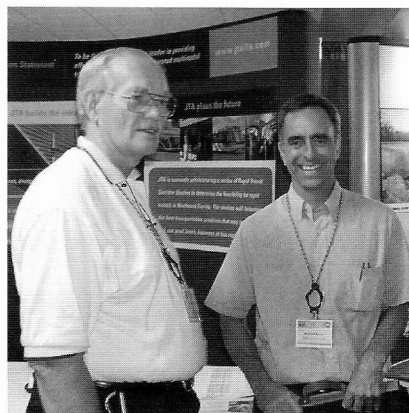
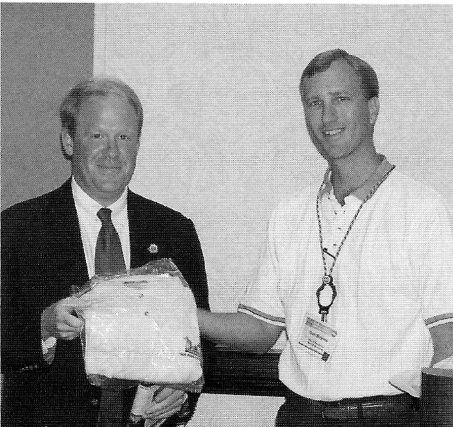
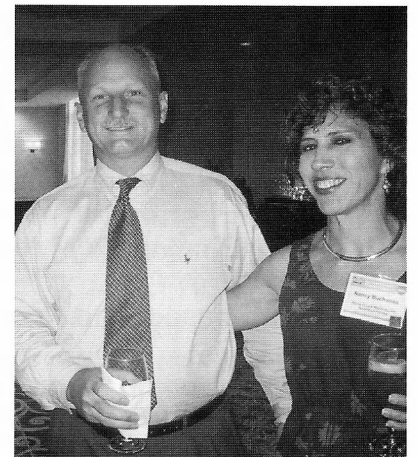
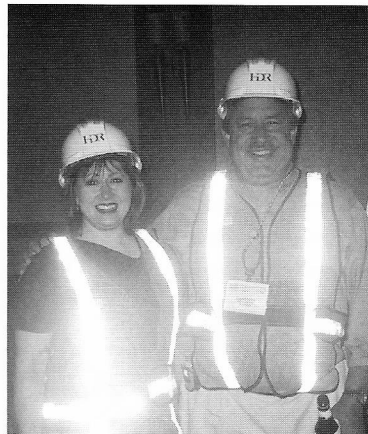
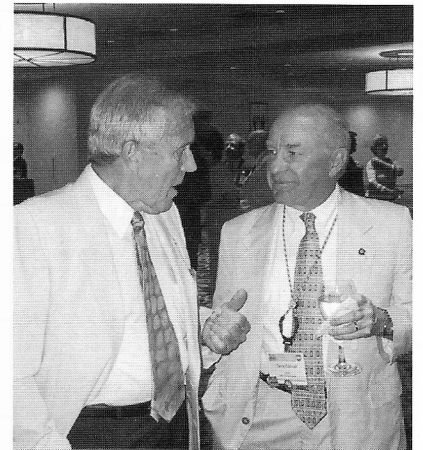
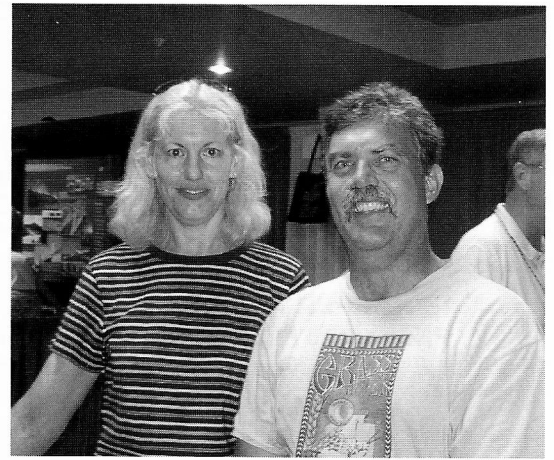


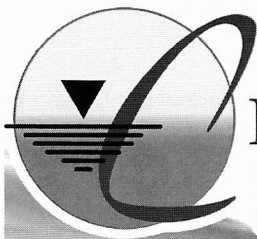
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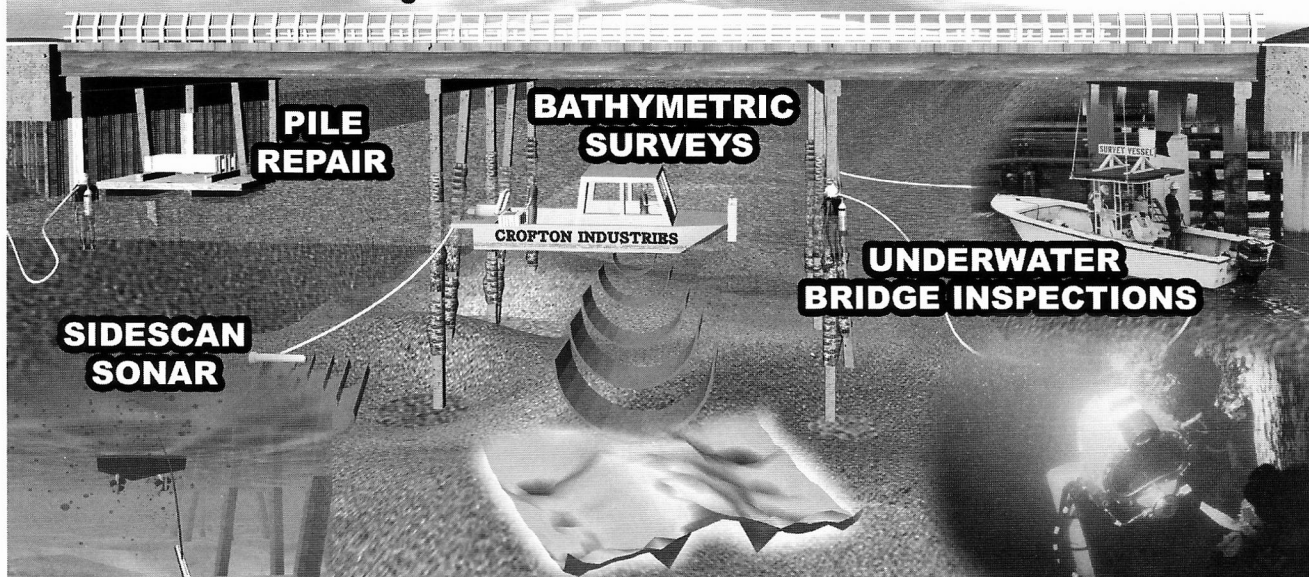
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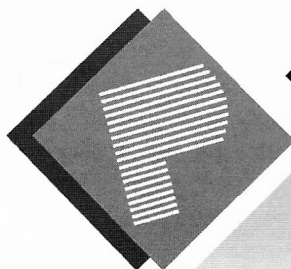
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# Sustainable Reconstruction of Miller Road

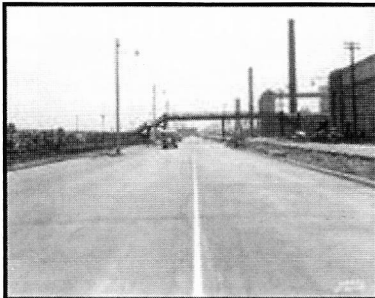
*Mannik and Smith Group Staff Collaboration; Richard Bertz, Coordinator*

The "Sustainable Reconstruction of Miller Road" was a significant project that utilized unique techniques. This project integrated enhanced water runoff quality and wildlife habitat, along with providing a more reliable means of transportation. The Construction Innovation Forum selected the project "Rouge Complex Sustainability Project" as a NOVA Award recipient. A key component of this effort was the "Sustainable Reconstruction of Miller Road." The project is located in Dearborn, Michigan. A public-private partnership was established between Ford Motor Company, the Michigan Department of Transportation, Wayne County and the City of Dearborn for the project.

In 1999, Ford announced plans to redevelop the entire Rouge industrial complex. This \$2 billion renovation and expansion program included upgrading of existing plants, replacing and updating the utility and road infrastructure and construction of new facilities at the complex. The redevelopment program included the 1.7 million square foot Dearborn Truck Assembly Plant. The reconstruction and reconfiguration of Miller Road was necessary to support the revised traffic levels and flow patterns created by Ford's renovation and expansion program, which is providing job retention and job creation.



*The Ford Rouge Center*

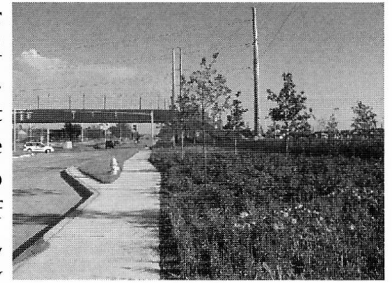


*View of the original pedestrian "Battle of the Overpass" bridge in the late 1930's.*

Ford Motor Company has been in existence for 100 years and the resultant historic heritage created is significant. From 1917 to 1925, Henry Ford built the revolutionary Rouge industrial complex that turned raw materials into complete automobiles at one site. The stored history of the complex is filled with drama, including production of multiple vehicle models such as the Model A,

Thunderbird and Mustang and the beginnings of unionization. The pedestrian bridge over Miller Road was the scene of the so-called "Battle of the Overpass" in 1937 between union organizers and security guards. Protection of the historic integrity of Miller Road and the overpass, along with drawing emphasis to the historic nature of the site and newly constructed autoworker memorials, were key project elements.

A new vision for Miller Road was developed and realized through this project. The vision was a safer road that incorporates sustainable environmental elements to enhance surface water runoff quality and wildlife habitat, and that serves as an entry point to the redeveloped Rouge industrial complex. This vision was achieved using civil engineering technology and techniques coupled with out-of-the-box thinking and expert architectural design.



*Use of sustainable landscapes to enhance water runoff quality.*

Storm water runoff from roads is a notable source of pollution to our natural waterways. The Miller Road project has a major emphasis on storm water quality enhancement. The project required a paradigm shift for designers who typically develop road designs that keep water as far away from roads as possible. The project resulted in development of a practical storm water management system that provides water quality enhancement while maintaining the structural integrity of the road. The Miller Road project will serve as the benchmark that future road projects are measured against in terms of positive impact on water quality.

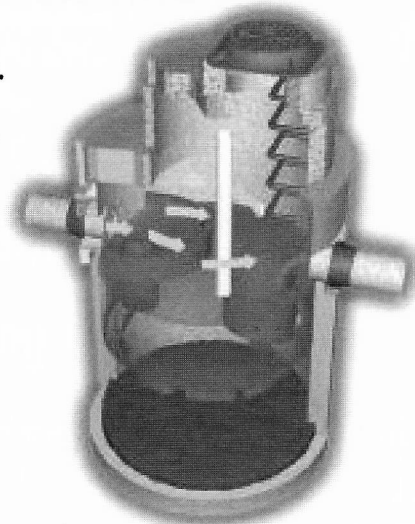
A major emphasis for redevelopment was transforming this 20th century industrial icon into a model of 21st century sustainable manufacturing. Ford's vision of environmental stewardship within the complex was extended to the Miller Road project. Storm water quality swales, indigenous plants, and creation of wildlife habitat are sustainable elements that were incorporated into the design. These environmental features create a sustainable gateway to the new healthy, productive and supportive work environment created by Ford's sustainable redevelopment.

The Mannik & Smith Group, Inc. (MSG) was the design civil engineer for the project. MSG offices are located in Maumee, Ohio and Dearborn, Monroe, and Lansing, Michigan. Walbridge Aldinger served as the program manager for Ford. Harley Ellis, W.H. Canon, William McDonough + Partners and Arcadis provided architectural services for the project. ■

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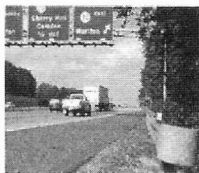
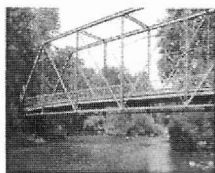
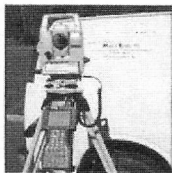
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# PennDOT Rebuilds Bridge Faster, Prettier

by David R. Zangrilli, Urban Engineers, Inc.

For thousands of tourists, Fruitville Pike is the most direct connection between U.S. 30 and historic downtown Lancaster. The Fruitville Pike Bridge carries PA Route 72 over Amtrak on the north side of Lancaster. Built by the Pennsylvania Railroad 75 years ago, the existing bridge was a two-span, two-lane, through girder bridge with a cantilevered sidewalk on the east side. Through years of service, the bridge had reached the end of its life.

The replacement bridge is also a two-span structure, with adjacent concrete box beams, providing two traffic lanes and a bicycle lane in each direction as well as a five-foot wide sidewalk on the east side. Four new mechanically stabilized earth (MSE) retaining walls allowed the roadway to be widened with minimal right-of-way acquisition. The project included new drainage, paving, sidewalks, signing, lighting, and traffic signals. When PennDOT opened bids on June 20, 2002, Allan A. Myers, of Worcester, PA, was the low bidder on the project at just under \$5.9 million.

The original two-year construction sequence called for traffic to be maintained on the existing bridge while the new northbound lanes were constructed. In order to provide clearance for the construction of the northbound half of the new bridge, the existing sidewalk and a small portion of the existing pier were to be removed. Traffic would then be switched to the new northbound side, the existing bridge demolished, and the new southbound lanes constructed.

Myers commenced construction in August 2002, following the as-bid sequence. In early November, as Myers was removing the small portion of the existing pier, cracks developed in the existing crash wall and pier cap. PennDOT directed Myers to halt demolition, monitored the cracks, and speculated about the possible causes. The cracks continued to widen and on November 11, PennDOT closed the bridge to traffic to avoid possible catastrophic failure. PennDOT and Myers negotiated

an acceleration agreement which called for one lane of traffic in each direction to be restored to the new bridge by Memorial Day 2003, and for the entire project to be completed by October 31, 2003.

PennDOT and Myers held several meetings during November and December 2002 to work out the details of the demolition procedure and the traffic detour. Myers subcontracted High Steel Structures, Inc. to remove the bridge superstructure. High dismantled the deck and most of the floor beams in late December, followed by the main girders and remaining floor beams in early January.

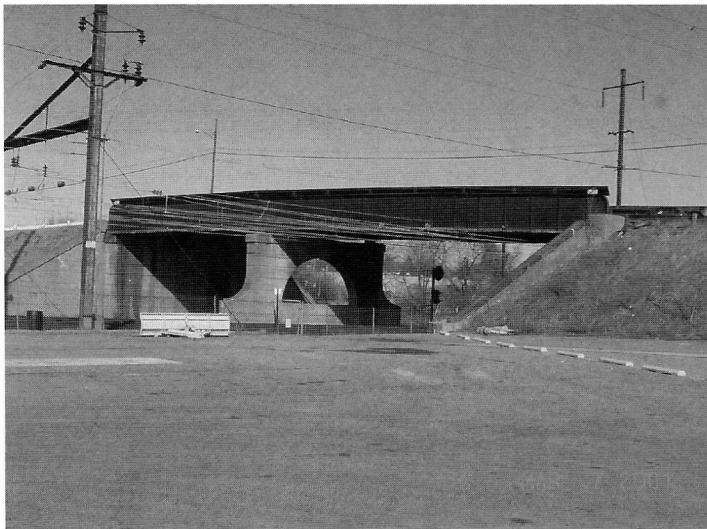
After Myers toppled the existing pier on January 17, it was discovered that the concrete for the pier crash wall extended only 18 inches below grade to the top of approximately two feet of dry rubble masonry. Although this marginal foundation was sufficient to support the bridge during its 75-year life, it was the most likely reason for the cracks which developed during demolition.

Myers' crews worked more than 50 hours per week from January through May, in some of the worst winter and spring weather in recent years, to open one lane in each direction on May 22.

Community involvement can make a big, positive difference on a project, if done correctly. Originally, the replacement bridge was designed to look like the majority of other bridges in the state: a non-descript gray. But after the project was underway, a group of local citizens interested in aesthetic enhancements to the bridge and retaining walls contacted PennDOT.

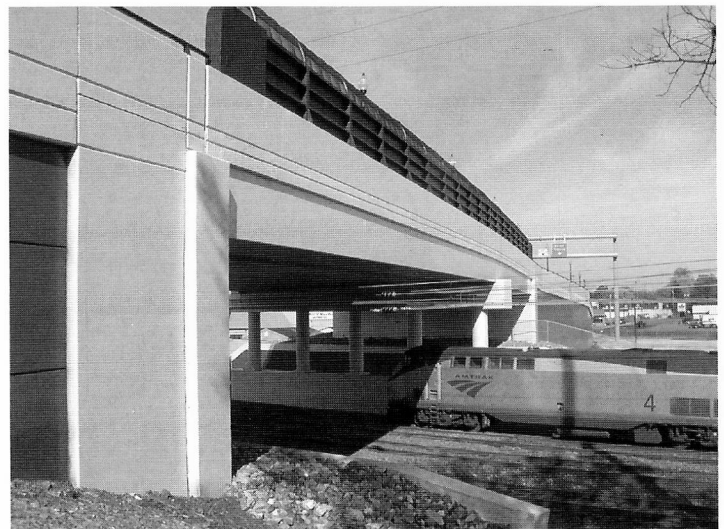
The group included a state senator, a state representative, a Lancaster County commissioner, a member of the Lancaster County Planning Commission, and two members of civic improvement organizations. At a September 2002 meeting, PennDOT and the civic group agreed on numerous

*"Fruitville Pike" continued p. 13*



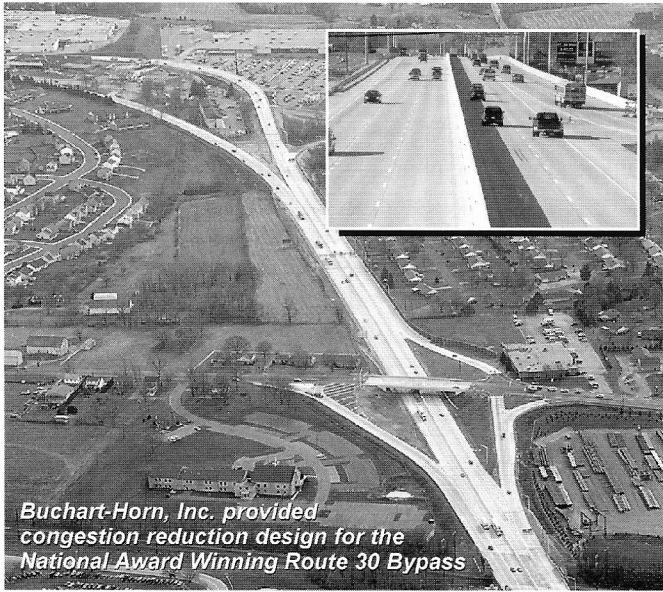
Existing bridge, viewed from southwest

Summer 2004 - 3



Completed bridge, viewed from southeast

- Construction Management
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*"Fruitville Pike" continued from p. 11*

enhancements: using an additional color of anti-graffiti coating; adding a decorative detail on the inside face of the parapets; anodizing railings and barriers; and adding decorative lighting.

The civic group proposed using colored concrete for the MSE retaining wall panels. Instead of colored concrete, PennDOT changed the color of the anti-graffiti base coat from tan to brick red. Following the original design, the outside face of the parapets would remain tan.

For the decorative detail on the inside face of the bridge and retaining wall parapets, PennDOT selected a brick-embossed form liner. On the east side of the project, adjacent to the sidewalk, the form liner stopped three inches from the top and bottom of the parapet wall, providing a smooth border to frame the brick pattern.

On the west side, the form liner was limited to the upper face of the safety shape barrier, again with a three-inch smooth top border. To maintain the structural integrity of the parapets, PennDOT added approximately one inch to the thickness of both parapets. Adding the form liner required the parapets to be cast in place, instead of slip-formed as Myers had bid.

Myers' subcontractor, LZ Painting, used brushes to apply a red anti-graffiti base coat to each individual brick in the form liner area. The mortar joints were painted with only clear anti-graffiti coating allowing the gray concrete to show through, contrasting with the red bricks.

The project was designed with an Amtrak standard aluminum protective barrier on the bridge, single-tube PennDOT hand railing on the retaining wall parapets, and PennDOT pedestrian railings along the sidewalk at the ends of the parapets on the east side. PennDOT and the civic group agreed on a black anodized aluminum finish for the barrier and the railings.



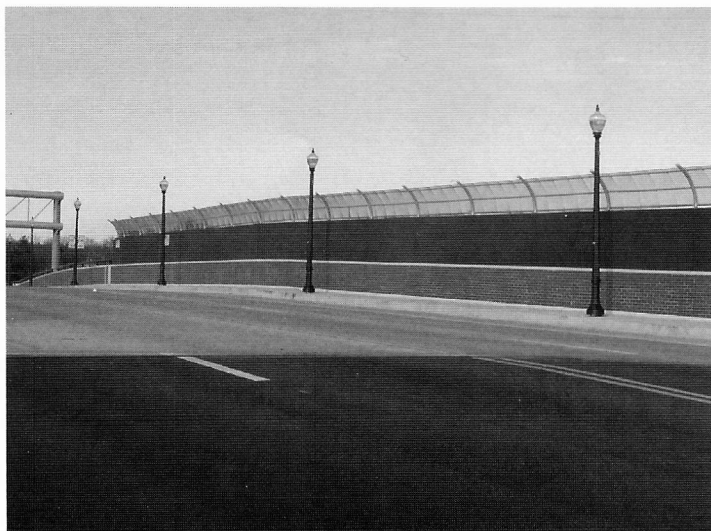
*Handpainting brick pattern on northeast wall*

The fourth request from the civic group concerned the addition of decorative lighting to the project. PennDOT arranged for PPL, the local electric utility company, to furnish and install 18 poles identical to those in Lancaster's historic district. Myers installed the conduit, wire, and anchor bolts for the poles.

"Community involvement in any of these projects is a good way to go," says Larry Hoffman, a District 8 construction services engineer with PennDOT and based in Harrisburg. "And now that the bridge is complete and the design a big hit, they now want to approach other bridges in Lancaster County the same way." ■

*David R. Zangrilli is a Construction Manager with Urban Engineers, Inc., Mechanicsburg, PA, and a Past President of the Harrisburg Section of ASHE.*

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*East parapet with decorative lights, and black anodized barrier*



*Northeast wall forming parapet wall*

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# Out of Plumb: Combating Erection and Construction Problems in Curved Girder Bridges

John Yadlosky, P.E. and Jason Fuller, P.E.

Construction of horizontally curved steel bridges is generally more complex than construction of comparable straight-girder bridges of similar span. Curved-girder bridges, once completed, have generally performed as intended. The majority of problems with curved-girder bridges have usually been related to fabrication and assembly procedures or deformations that occur during construction not accounted for in the design. As a result, these construction issues take on primary importance in successful completion of the structure. Each phase of construction must proceed as anticipated to ensure the final structure is at the appropriate elevation to provide proper deck drainage and good riding quality, and that secondary stresses are not induced as a result of geometric changes.

In some cases, construction issues have been given little or no special consideration by designers or, at the very least, no more consideration than has been given to these issues for straight bridges. Thus, 480/Kennedy Freeway Interchange in Omaha, Nebraska identifies these issues, assemble and provide more in-depth information to the design community, and emphasize their importance to designers. The significance of construction issues to complex, horizontally curved steel bridges is in many ways analogous to their prominence in the design of segmental concrete bridges: construction issues often drive the design decisions. The objective of this article is to promote awareness of one of these construction issues in the design of horizontally curved steel bridges.



An example of a large curved I-girder bridge during reconstruction of the I-80/I-480 interchange in Omaha, Nebraska

## Out of Plumb vs. Inconsistent Detailing

Horizontally curved girders deflect vertically and rotate upon being loaded. This rotation is the result of various force effects (warping, nonlinearity and horizontal bending), but is caused by the eccentricity of the load to the girder. This eccentricity is the difference in offset from a chord line drawn between bearings and the centerline of the girder along the curve. A torsional force is created that must be resisted by the girder. The girder responds to this torsional force by twisting.

Because of this tendency to rotate upon being loaded, horizontally curved girders cannot remain plumb both before and after a permanent load is applied. The girders will return to their original positions when the load is removed if the load was applied elastically with respect to both vertical and lateral bending stresses. The fabrication and erection of horizontally curved girders out of plumb, such that upon the application of permanent vertical loads the web becomes plumb, is typically not addressed in the literature.

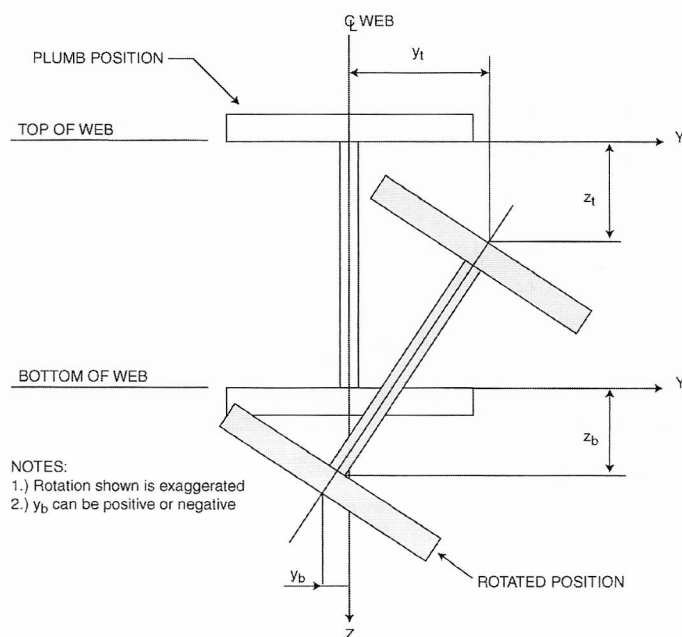
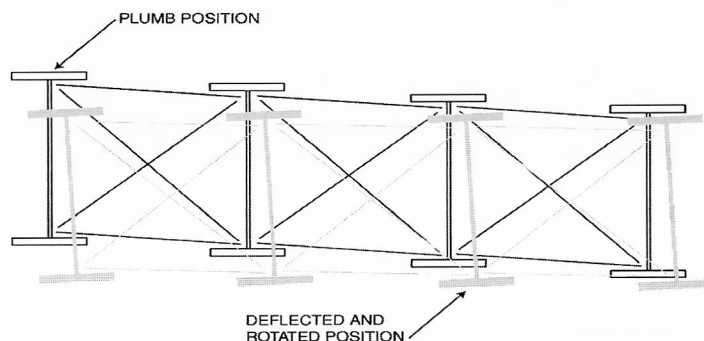


Illustration of deflection and rotation of a curved I-girder, the result of various force effects.

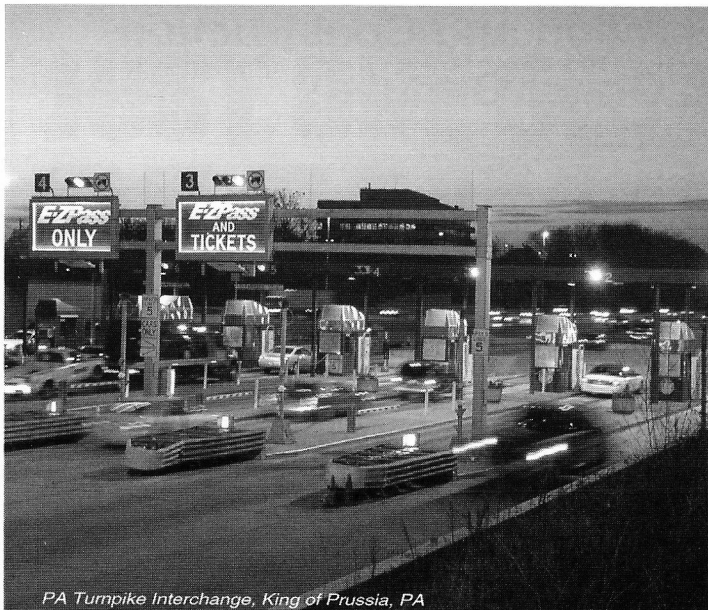
(See FHWA-RD-93-129, "Curved Steel Bridge Research Project, Interim Report I: Synthesis," by Zureick, Naqib and Yadlosky, as an initial resource.) Additional rotational camber information may need to be shown on the drawings to correctly detail girders initially out of plumb.

Note, however, that straight I-girders used on skewed bridge alignments are sometimes intentionally forced out of plumb at the time of erection. The result is that upon placing the permanent dead load, the webs return to plumb above the bearings at the skewed supports. (This process can be and is applied to box girders but is much more complex to analyze and detail.) This out-of-plumb condition is accomplished by adjusting the crossframe or diaphragm geometry to account for the differential deflection that occurs from one end of the crossframe to the other. The I-girder fabrication is not adjusted for this correction to the crossframe geometry. The torsional stresses created in the girder are generally small, temporary

"Plumb" continued on p. 17



The effects of detailing the girders plumb and the crossframes to fit in the no load condition is that the erector must be able to obtain this position in the field and the girder placed to accommodate the change in orientation of the girder axes, with respect to bending.



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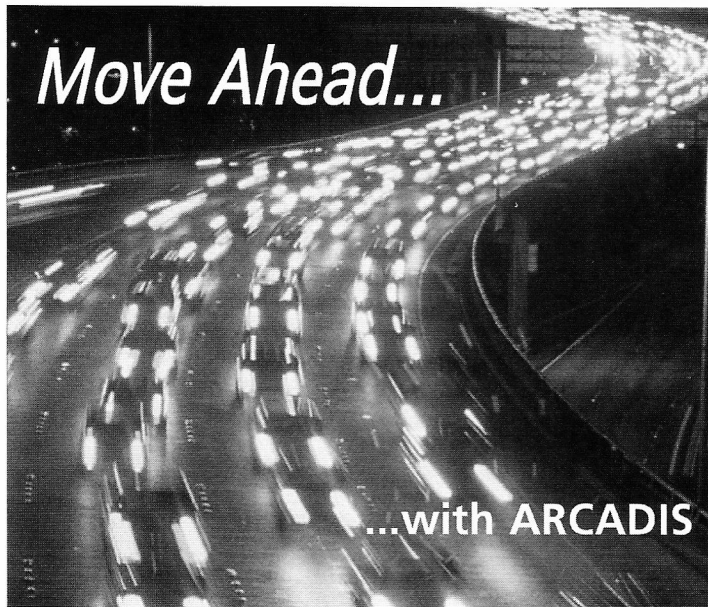
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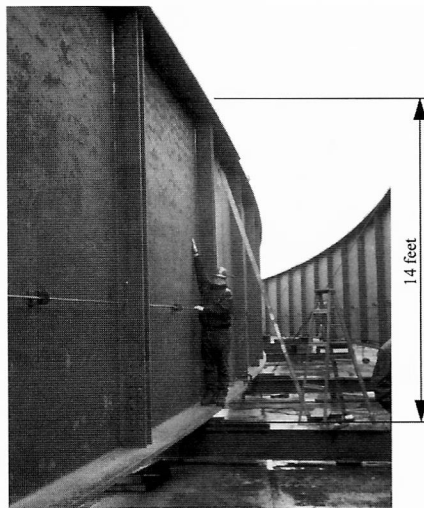
*"Plumb" continued from p. 15*

and usually can be neglected. Upon rotation at the ends, the girder returns to plumb and the torsional stresses induced during erection are reversed. For this condition in straight girders, the "inconsistent detailing" between the girders and the crossframes is acceptable.

As further clarification of the inconsistency which arises from the detailing of the girder to one geometric condition and the crossframes to another, consider the following: if the girder is fabricated to fit to the crossframes in a plumb (no load) condition but the crossframe is detailed to connect to the girder with the girder in a twisted (loaded) position, an inconsistency occurs. Depending upon the circumstances, this situation may be acceptable, as discussed above for the straight girder. Alternatively, this situation may not be acceptable for a curved girder.

While a straight I-girder is torsionally weak, a curved I-girder is stiffer due to the curvature, more closely spaced crossframes or temporary support conditions. The fabrication of a curved girder to one load position and the crossframes to another will induce additional stresses and secondary deflections, depending upon the girder geometry. For example, fabricating a straight girder to the no load position (the camber position typically shown on the design drawings) and the crossframes to either the no load or the steel dead load position usually has no appreciable influence on vertical deflections. In most cases, the relative geometry of the crossframe will not change enough to cause any adverse effects. This is not necessarily true for curved girders and is exacerbated as the size of the bridge (girders) increases.

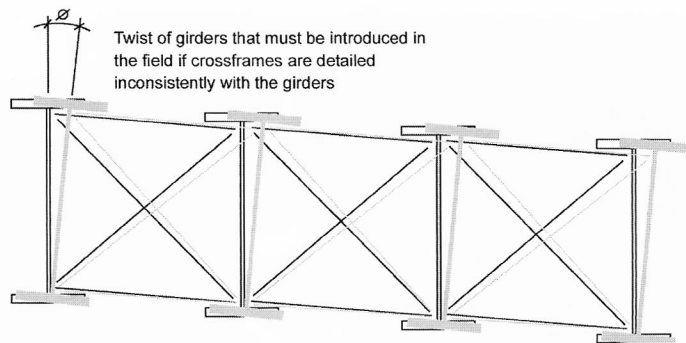
The fabrication of a horizontally curved girder to the no load position, as typically shown on the camber drawings, and the crossframes to the same position results in an erected structure with no geometrically induced secondary stresses. By erecting the girders and installing the crossframes in the same no load position, the gravity turned off assumption is obtained as assumed in a normal analysis. Upon releasing the system



*As the size of curved girders increases, so does the likelihood of adverse effects.*

(effectively turning gravity on), the stresses will be as calculated in the analysis, as long as small deflection theory applies. If the girders

are not fabricated to a position consistent with the crossframes, forces will need to be applied during erection to bring the components into alignment. In bridges with sharp curvatures, deep webs (which cause an increase in stiffness because of their depth and associated wider flanges that increase torsional properties) and long span lengths, the forces resulting from such an inconsistency in detailing can be significant. Even if the loads generated from forcing the pieces to fit are acceptable, erection may become complicated or impossible, depending upon the resources available.



*Indicates the order of magnitude of inconsistent geometry if the girders are detailed plumb at no load and the crossframes plumb at a different loading condition. The erector in the field must apply the forces necessary to close this gap in geometry.*

For a curved girder bridge fabricated inconsistently, larger capacity cranes, temporary shoring or jacking frames may be required beyond those to erect a curved girder bridge with the girders and crossframes fabricated consistently. In addition, the full cambered position (no load position for erection with minimal stress) of the girders is affected and must be adjusted to account for this inconsistency in detailing. Other than for straight girders with mild skews, intentional inconsistencies in fabrication must be evaluated for their effect on the stresses in the girders and crossframes, the resultant deformations and the impact on normal erection procedures.

## Summary

Designers need to be aware of specific construction issues related to horizontally curved, steel-girder bridges. Some important issues related to erection have been identified in this article. Although specific solutions are not presented here, it is hoped that by increasing awareness, designers will be more cognizant of the curved girder issues and their possible effect on design decisions and the required level of analysis. ■



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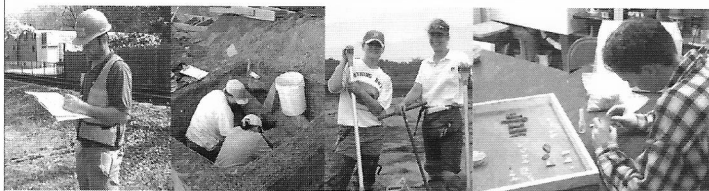
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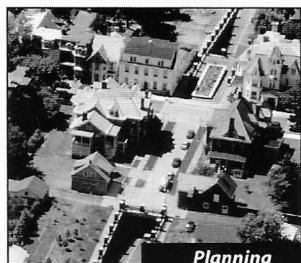
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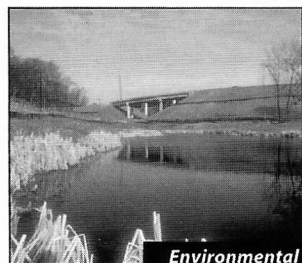
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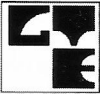
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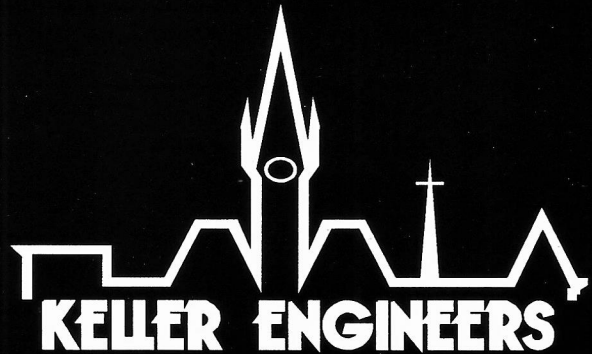
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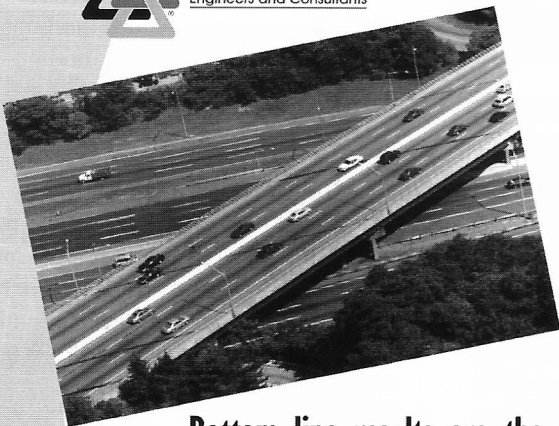
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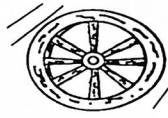
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Harvey S. Knauer, P.E., P.L.S., was recently recognized as a Member Emeritus of the Transportation Research Board's (TRB) Committee on Transportation-Related Noise and Vibration. The TRB is a division of the National Research Council, which serves as an independent adviser to the federal government and others on scientific and technical questions of national importance. Knauer's selection represents peer recognition at the highest level.

TRB established the emeritus membership category to recognize significant and long-term contributions of individuals who have provided outstanding service through participation in standing committees. Knauer has been actively involved with the TRB committee since 1979.

With more than 37 years of experience, Knauer is Vice President of Environmental Acoustics Inc. (EAI), a Harrisburg, PA based company that provides services associated with transportation and community noise and air quality. He is responsible for all phases of acoustical and air quality analyses including noise monitoring, impact and mitigation analyses.

Knauer holds a bachelor of science in civil engineering from the University of Miami and a master of science in civil engineering from Villanova University. He is a registered professional engineer and a professional land surveyor in Pennsylvania. Knauer has been a member of the American Society of Highway Engineers since 1967, where he served on the Delaware Valley Section Board of Directors and was the technical program chair for the 1997 National Convention.

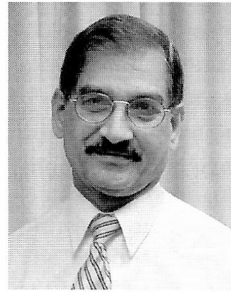


### **GAI Hires Key Staff Member for Pittsburgh Office**

GAI Consultants is pleased to announce the addition of **John Wojtyna, P.E.** to their Pittsburgh, Pennsylvania office as a Practice Builder responsible for developing transportation business for all GAI offices located throughout the United States.

Mr. Wojtyna was most recently employed by a national consulting-engineering firm in Pittsburgh, PA where he was an Associate Vice President and Director of Construction Services for their Pittsburgh, Philadelphia, and Baltimore operations.

Along with Mr. Wojtyna's 32 years of experience in the transportation industry, he is also a graduate of the University of Pittsburgh with a B.S. in Civil Engineering, and is a registered Professional Engineer in the states of Pennsylvania, Florida, and Delaware.



### **Pennoni Associates Promotes Batra to Associate Vice President**

Pennoni Associates, Inc. has named **Kash Batra** as Associate Vice President for Transportation Technology. Mr. Batra most recently served as the Director of Transportation Contract Management for Pennoni at its Camp Hill operation, and has over 30 years of civil engineering experience.

Mr. Batra was hired by Pennoni as a Senior Engineer in April of 1999 after working for 31 years for PennDOT. In 2000 he was promoted to Division Manager. He obtained his Bachelors Degree in Civil Engineering while in India and a Masters Degree in Civil Engineering from Georgia Institute of Technology. He is a Registered Professional Engineer in Pennsylvania, and a member of ASHE.

"Kash has done a tremendous job of ensuring that Pennoni is operating cost effectively," says David S. Lowdermilk, P.E., Vice President and Transportation Technology Principal.

Mr. Batra lives in Mechanicsburg, Pennsylvania with his wife Sashi and has two grown children.



### **Lawrence Egan, Jr. Joins Pennoni as Senior Engineer for Transportation Technology**

Pennoni Associates Inc., an Engineering News Record Top 150 consulting engineering firm headquartered in Philadelphia, is pleased to announce the hiring of Lawrence Egan, Jr. as a Senior Engineer for Transportation Technology in Wilkes-Barre, Pennsylvania.

Mr. Egan has 10 years of civil engineering experience. Before joining Pennoni, he worked with both Barton-Lawson and Modjeski and Masters. He has a BS in Civil Engineering from the University of Maryland at College Park, and is a Registered Professional Engineer as well as a Certified Bridge and Safety Inspector (CBSI).

A member of ASHE, Mr. Egan currently resides in Lehman, Pennsylvania with his wife Georgia and three children. ■

*"Wilson Bridge" continued from p. 1*

In addition to the new Wilson Bridge, new interchanges at I-295 and Maryland 210 are scheduled to be completed in 2008, as well as the bulk of the revamped U.S. Route 1 Interchange, which will be fully completed in 2009. The entire seven and a half mile project is scheduled to be finished in 2011, with completion of the Telegraph Road Interchange and community and aesthetic improvements.

#### **Four Years of Progress**

Construction began in October 2000 with dredging a construction channel in the environmentally sensitive Potomac River, which is only a few feet deep across most of its expanse. Some 340,000 cubic yards of river mud were excavated in this \$15 million contract - setting the stage for the second phase of construction: foundations.

The \$125 million foundations job began in spring 2001 and encompassed building foundation footings that will support the above-water portions of the new Woodrow Wilson Bridge. In approximately two years, workers completed 61 of 72 pedestals, the pyramid-shaped foundations that will support the v-shaped piers for the new bridge's 17 touchdown points (11 in the river and six on land in Virginia).

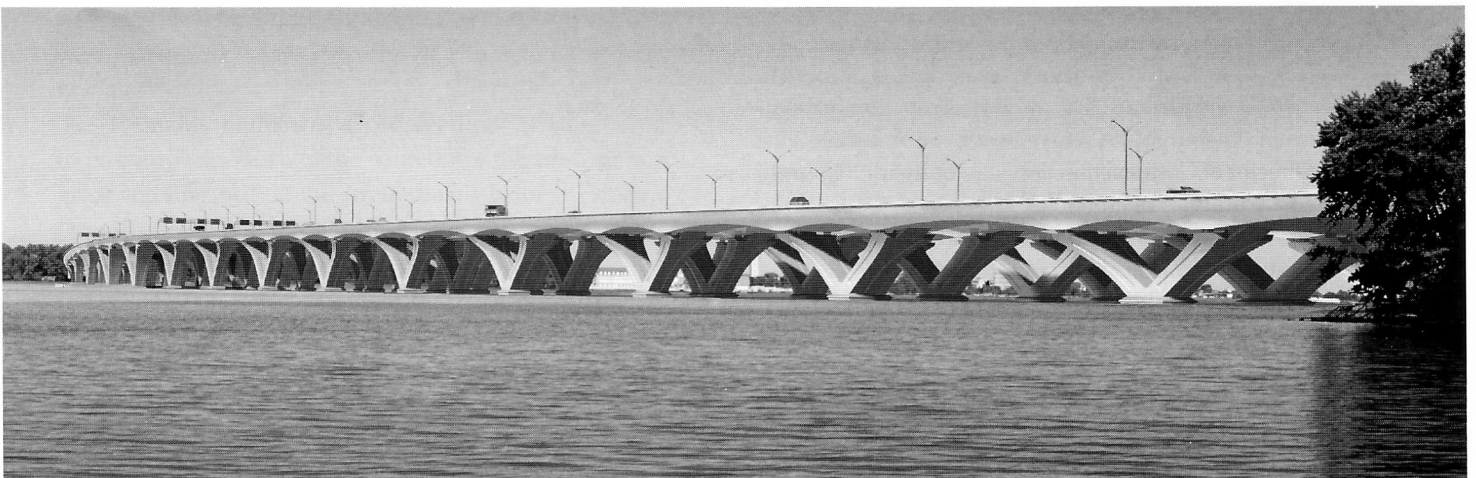
Underway since February 2003, the draw span or bascule portion of the new bridge will feature twin draw spans, each with two leaves that consist of more than 14 million pounds of steel. As current bridge travelers can see, enormous support falsework, reaching beyond 70 feet, is being used to form the draw span piers as they are cast in place. The falsework is adjusted and reused as the piers' final forms take shape. The piers

that will support the Outer Loop draw span are expected to be completed by early 2005, while the Inner Loop draw span support piers are slated for completion in early 2006.

Construction of the approaches to the draw spans began in spring 2003. In contrast to the cast-in-place method for the draw spans' concrete piers, segments for the approach piers are being pre-cast and then erected with post-tensioning cable that unites the elements and provides enormous weight-bearing strength. The Maryland Approach, from the Maryland shoreline to the draw span, involves mainly marine construction, while the Virginia Approach, which begins more than a quarter-mile inland at the Virginia abutment and connects to the draw span, is primarily over land. Combined, construction of the new draw spans and Maryland and Virginia approaches is valued at approximately \$500 million.

During 2004 and 2005, the Maryland approach piers will become increasingly evident. Landside in Virginia, several of the piers will be substantially complete by late summer 2004, with more to come, demonstrating steady progress toward the planned opening of the new bridge.

Substantial work to improve the Capital Beltway and interchanges at U.S. Route 1 and Telegraph Road in Virginia, and I-295 and Maryland 210 matches the progress on the new bridge. Significant milestones have been achieved with completion of the first major landside contracts - ground strengthening work in Virginia and Maryland and the opening of new ramps on the I-295 interchange improvement in Maryland. Other landside construction continues to move forward rapidly, as well, with work on new ramps, bridges and roadway visibly underway throughout the project corridor. ■



*New bridge south of Rosalie Island, Maryland*



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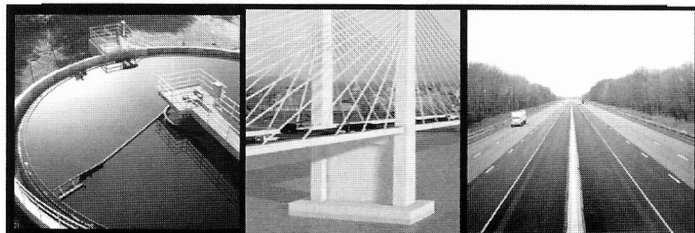
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The SCANNER is published quarterly by the American Society of Highway Engineers and delivered to over 5,700 readers nationwide.

- 18% are State D.O.T. Employees
- 62% are Engineering Consultants
- 10% are Contractors
- 10% are Related Professions
- 45% of the membership have a professional status

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