

# SCANNER

NEWSLETTER OF THE AMERICAN SOCIETY OF  
HIGHWAY ENGINEERS



May - 1996 - 2

## CAROLINA PIEDMONT SECTION CHARTERED

The Carolina Piedmont Section was officially chartered on January 11, 1996, in Charlotte, North Carolina, as the 34th section of ASHE. Attending the charter ceremonies were Tom Haslett, P.E. ASHE National President, who presented the charter and installed the officers and the Board of Directors, as well as Robert Pearson, National Director. Peter Pappas, NCDOT Board of Transportation member, followed as the keynote speaker, discussing the proposed North Carolina Highway Bond Program. Even though the weather was extremely bad, eighty-four members were in attendance. At the conclusion of the meeting, all members received their certificates, lapel pins, and membership cards. The charter was also signed by all members in attendance.

The Carolina Triangle Section was very instrumental in the formation of the Carolina Piedmont Section. Robert Pearson, National Director, had initial contacts in 1994 about establishing a Piedmont North Carolina Section. In January, 1995, along with Dave Greenwood, ASHE National First Vice President, and Tracy Hill an introductory meeting was sponsored with over 30 people in attendance.

The officers of the Carolina Piedmont Section includes: Tracy L. Hill, President (Espey, Huston & Associates); Timothy Boland, First Vice President (North Carolina Department of Transportation); Jesse Hite, Second Vice President (Gannett Fleming); Secretary, Rich Clifton (City of Charlotte-Department of Transportation); and Treasurer, Scott Chinery (Ralph Whitehead & Associates). The Board of Directors is composed of Michael Bishop (Martin Marietta Aggregates), William Copeland (Rea Construction), Ron McCain (City of Charlotte-Engineering and Property Management), Michael Patton (North Carolina Department of Transportation), Alex Rankin (Concord Engineering & Surveying), and John Warren (Post, Buckley, Schuh & Jernigan).

The organization for this new section began in earnest in the spring of 1995, with the first organizational meeting

being held in March 1995, at which time the initial officers and board of directors were appointed. A "get acquainted" reception was held in October, and a joint meeting with the Carolina Triangle Section was held in November. The membership of this section covers a fairly large area of North Carolina's Piedmont from Winston-Salem, Shelby, Monroe, Albemarle, and Salisbury, to mention a few. It is a very diverse group, with members from both the public and private sectors, including departments of transportation, city and county governments, consultants, contractors and suppliers. With a current membership of over 145, the new section has great anticipation for its future role in the highway industry. A special thanks and congratulations go to Bob Pearson, National Director, who has been one of the driving forces in establishing this Section and the Carolina Triangle Section for their efforts on expansion of ASHE in North Carolina along with members of the National Board and the New Sections Committee for the chartering of the Carolina Piedmont Section. ■



National President Thomas Haslett presents Charter to Tracy Hill,  
President of Carolina Piedmont Section.

Make your plans to attend the "Orlando ASHE 1996 Conference"  
from June 26-29, 1996.

Registration forms are included in the SCANNER.



# NATIONAL BOARD NEWS

The National Board met for a regular board meeting on April 19, 1996 in New Stanton, PA. National President Thomas J. Haslett, P.E. presided over the meeting. The following are highlights of the committee reports and actions.

## NEW SECTIONS COMMITTEE:

Chairman David Greenwood reported that an additional informational/organizational meeting was held on February 27, 1996, in **Atlanta, Georgia** with DOT representatives, including Frank L. Dauchetz, Chief Engineer, to address concern about ASHE's purpose and objectives. Cooper Curtis and Ray Petrucci also attended. They received a positive response and look forward to GEORGIADOT support in developing a section in the near future.

Cooper Curtis is working closely with perspective members in **Jacksonville, Florida**. Although they only have approximately 30 to 35 prospective members he is suggesting they move ahead with chartering a section. Cooper expressed confidence that additional members would sign up.

David Greenwood has sent materials/applications to several contacts in the **St. Louis, Missouri** area. Cooper Curtis is working with an individual who has offered to establish a section in this area. Currently a follow-up informational meeting is being scheduled.

## MEMBERSHIP:

Pat Welsh reported that over half the sections did not submit their membership diskettes with updated information for printing of a National Membership Directory. Also, sections are encouraged to pursue ads to help offset publication costs. The deadline will move with the cooperation of the sections.

## PUBLIC RELATIONS COMMITTEE:

Chairman Frank Lopez led discussion on requirements to accrue continuing education credits to maintain NICET certification and several states that are requiring ongoing education credits to maintain professional registration. Typically credit is given for membership and active participation in professional organizations such as ASHE. Pasquale Dougherty reported that Delaware Valley Section is establishing CEU's for the technical program of the 1997 National Conference.

## EXECUTIVE DIRECTOR COMMITTEE:

Chairman Michael Martin discussed input received from ASHE National Officers on the proposed multi-year plan (1996-1999) to implement Association Management Services. The board reviewed the revised proposal and recommended changes which will be redrafted and attached to the National Board meeting minutes. Following are details of the multi-year plan:

### Year 1 (1996/97)

- Association Management to take over publication of the SCANNER.
- Maintain ASHE's exhibit display booth.
- Investigate travel agency relationships for member services.

### Year 2 (1997/98)

- Assist 1998 conference committee.
- Investigate special ASHE sponsored services to members.

### Year 3 (1998/99)

- Assist in publishing ASHE's National Directory.
- Make recommendations to provide on-line ASHE Home Page and membership services via phone/fax.
- Assist membership committee to design a program for expanding membership.
- Set up technical/professional training seminars.

Michael Martin will clarify contract issues and prepare for final board approval of Association Management Services at the next National board meeting.

## LONG RANGE PLAN:

Chairman Pasquale Dougherty presented and reviewed redraft Long Range Plan 1997-2000 prepared from input provided by sections. The plan received board approval and will be published and sent to the sections for distribution. ■

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# INTERNATIONAL BRIDGE CONFERENCE AND EXHIBITION

The 13th Annual International Bridge Conference and Exhibition will be held on June 3-5, 1996 at the Pittsburgh Hilton and Towers, Pittsburgh, Pennsylvania. Sponsored by the Engineers' Society of Western Pennsylvania, this three-day conference is recognized as the most comprehensive, broad-based and authoritative forum on bridge topics. The theme for the 1996 Conference is "New Perspectives on Bridges". One of the main attractions of the Conference is the **IBC EXPO** which includes over 100 exhibitors showcasing the latest in bridge products and services.

The IBC offers **ten technical sessions** featuring nearly eighty paper presentations. Session topics include: Long Span Bridges, Construction, Design, Load Testing, Innovative Design Concepts, Rehabilitation and Strengthening, and Seismic Design. Two **Proprietary Sessions** will intro-

duce **NEW** bridge products, methods or applications. A full afternoon session and exhibit room will be devoted to the bridge program in the state of **Minnesota**, the **IBC 1996 Featured State**. In addition to the technical sessions, four half-day **Educational Seminars** will be offered. These seminars take an in-depth look at important industry topics. Seminar subjects include: fiberglass-Composite Bridges, Steel Bridge Superstructure-Substructure Connections, Concrete Bridge Design, and Steel Bridge Design.

**Special Interest Sessions** are a recent addition to the IBC format. Sponsored by various firms and organizations, these sessions focus on timely matters relative to bridge engineering. Session topics include: One Coat Systems for Steel Bridges, DP98-Underwater Evaluation and Repair of Bridge Components, DP97-Scour

Monitoring and Instrumentation, ASTM Subcommittee D04.32, Construction Law, and A.R.E.A. Committee No. 8 Meeting.

The IBC's program and activities provide bridge professionals with an excellent venue for an update on state-of-the-art bridge technology. A variety of social functions have also been scheduled to provide attendees with **exceptional networking opportunities**.

For more information on the 13th Annual International Bridge Conference, contact the Engineers' Society of Western Pennsylvania at 412/261-0710 ext. 12. ■

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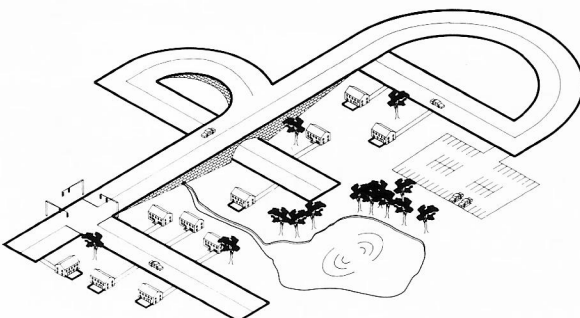
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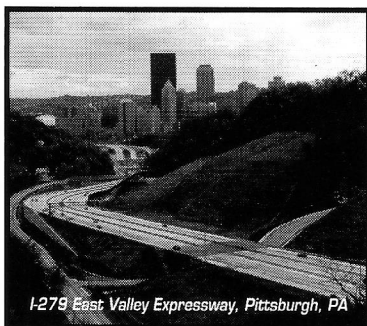
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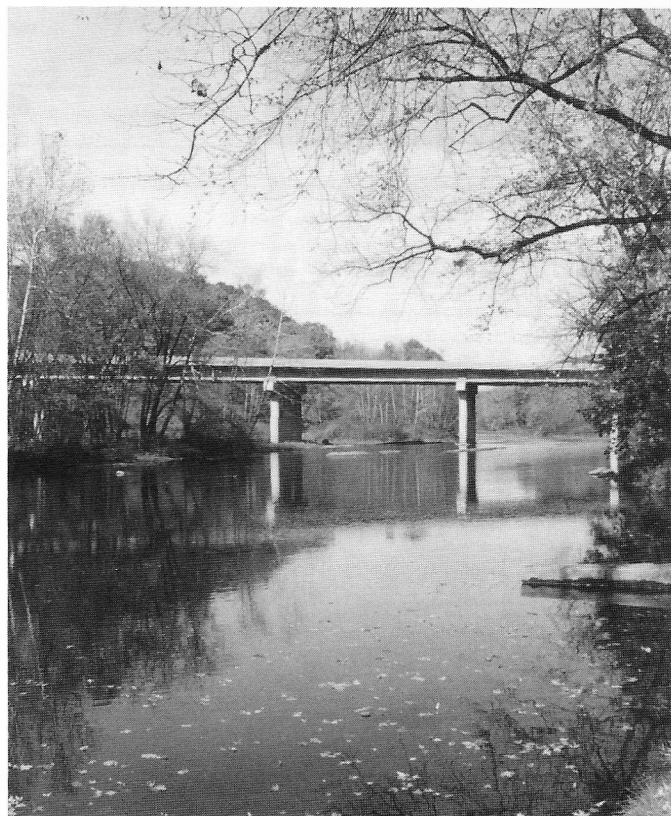
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# NORTH CANTON MAIN STREET RECONSTRUCTION & BEAUTIFICATION PROJECT

By: Phillip L. Roush, P.E., P.S., City Engineer, City of North Canton &  
Richard A. Hunsicker, P.E., P.S., Project Manager, CT Consultants, Inc. (Cuyahoga Valley Sections)

The City of North Canton located in Stark County, Ohio, is in the midst of a multi-phase road reconstruction and beautification program for Main Street which is the City's commercial and business corridor.

Phase I which was constructed in 1994 at a cost of \$2.5 million combined these key elements: a) utility reconstruction, b) pavement replacement, c) traffic safety upgrade and d) streetscape beautification.

The project began with detail planning and coordination between the City of North Canton and the Ohio Power Company, Ameritech and Warner Cable to remove existing overhead wires and poles and relocate these utilities underground.

The existing water and sanitary sewer lines which were approximately 60 years old were replaced including all service connections, fire hydrants, valves and manholes. Storm catch basins were moved into the new gutter line and some sections of storm sewer were replaced.

The total pavement reconstruction involved removing the existing asphalt over brick pavement down to the concrete base. Pavement corings made during design of the project showed the existing concrete base was in sound condition and could remain as the pavement base. The concrete base was replaced where utilities were reconstructed. The existing concrete curb was removed and replaced with new concrete combination curb and gutter. New asphalt pavement was then placed over the concrete base.

All new concrete and brick sidewalks were constructed behind the curb and gutter. A two foot band of paving brick was used to separate the new sidewalk from the curb and gutter. At the intersections, the new sidewalk was constructed completely with paving brick and included curb ramps to provide handicapped accessibility.

Traffic safety upgrades included all new traffic signals, pedestrian crossings and the addition of left turn lanes at Charlotte Street and Main Street.

To showcase the new Main Street, all new decorative street lighting was installed along with brick walls behind the new sidewalk to provide a visual separation of the parking areas from the street. The new street lights were equipped with brackets to display a flag and electric outlets for Christmas decorations.

New park benches and brick walkways were included in two park areas along Main Street at Maple Street at the center of town. This intersection was also highlighted with a concrete pavement in the street intersection surrounded by pedestrian crossings made of paving brick.

Local contractors and suppliers participated in the project. Design and plan preparation was done by CT Consultants, Inc. of North Canton. The general contractor was Northstar Asphalt of North Canton. Electrical work was provided by W. W. Schaub Electric of North Canton. Street lights and traffic poles were fabricated by Union Metal Company of Canton. Paving brick was supplied by Whitaker-Greer of Alliance. Wall brick was supplied by Belden Brick of Canton.

Phase II of the Main Street road reconstruction and beautification project is currently under construction at a cost of \$1 million.

Phase III is currently in planning and design with utility relocations scheduled in late 1996 and full roadway construction and beautification work scheduled for 1997.



North Canton's Main Street project combines utility and pavement reconstruction with street beautification.



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# ALTOONA ASHE HONORS COVERED BRIDGE ADVOCATE

By: Sandy Ivory, Altoona ASHE



*Jackson's Mill Covered Bridge, Bedford County, PA*

Her grandfather's travels as a circuit preacher through the covered bridges of Bedford County many years ago connects Sandra Crawford to her present day work as she continues to push for the restoration of the "Kissin' Bridges."

Born in a log cabin in Wolfsburg along Route

30 in Bedford County, Ms. Crawford remembers her mother talking about the times she rode with her father as he traveled around the area to preach. "My mother always referred to the covered bridges, saying how beautiful they were so I have always had a special feeling towards them." And that special feeling has rewarded the residents and visitors of Bedford County with a link to the past.

Ms. Crawford, who is president of the Bedford County Covered Bridge Society, was honored for her work by the Altoona ASHE Section at the annual banquet in March when she received the 1995-96 Distinguished Service Award. She began her crusade to save Bedford County's covered bridges from extinction in the 1980s when she realized the bridges were being ignored and a plan to save the structures was nonexistent. She started by organizing a state-wide covered bridge workshop so she could learn from others how to preserve the historic structures. That workshop was held in Bedford County in October of 1989.

Since then, with Ms. Crawford as the tireless advocate, the Bedford County Commissioners have completed restoration of three (Jackson's Mill, Hall's Mill and Snook s) of the county's 14 covered bridges and the fourth, the Ryot Bridge, is under construction. A fifth covered bridge, the Herline (closed for 10 years), was taken over by Bedford County from the state in 1995 and is scheduled for construction in March.

"You know, this didn't all happen just because of me," she emphasized about the restorations. "I'm blessed with wonderful members of the Society, caring county commissioners and Pennsylvania Department of Transportation officials, an interested county engineer, concerned legislators and interested citizens. There are a lot of people involved that deserve credit."

The first restored bridge in Bedford County, the Jackson's Mill span, won a 1992 Pennsylvania Department of Transportation Design Award in the Rural, Historical category for the P. Joseph Lehman, Inc., firm of Hollidaysburg. Upper most in everyone's minds was how to keep as much of the remaining bridge as possible while complying with current specifications.

Robert Bryant, PE, of the Lehman firm said the timber from the original structure was tested and analyzed by Pennsylvania State University professors to determine how much of the wood was still suitable for the rehabilitation. The results showed approximately 90% was usable. However, the arch ends of the Burr-truss covered bridge suffered severe damage from insect infestation, as well as the elements and the structure's age, so these portions were replaced.

Mr. Bryant explains that steel beams were used as main load carrying members and to give lateral support to the covered bridge section. Teflon-coated plates were placed between the beams and the trusses, allowing for a heavier weight to cross the deck without damage since the traffic load would not be transferred to the trusses. The steel beams were spaced to maximize the deck efficiency and, at the same time, remain hidden so the visual concept of the bridge is not hindered.

Both abutments were replaced, but they were faced with original stone that

was salvaged from the crumbling abutments. The original piers were usable.

Newly installed safety features include timber wheel guards and an improved railing system, and a clearance device known as a "headache board" was erected on both ends of the structure to restrict oversized vehicles. As with the covered bridge elements, care was taken to restore and maintain the area's original appearance, especially the stream banks and nearby meadows which are home to native wildflowers and trees.

The bridge, now posted at 10 tons, serves township residents and maintenance equipment, emergency equipment, a nearby farmer and his vehicles, and the many tourists attracted to Bedford County area. This bridge, as well as the other covered bridges in Bedford County and across Pennsylvania, were included in a state study authorized by PA DOT eventually led to 100 percent funding through Act 26 monies that are saving many of these historic structures from extinction. ■



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# PERFORMANCE EVALUATION OF RAP AS A DENSE GRADED AGGREGATE BASE COURSE (DGABC) - USE OF RECYCLED MATERIALS

Environmental concerns in recent years have prompted the investigation and use of recycled materials in highway pavements. New Jersey DOT has been researching the use of Reclaimed Asphalt Pavement (RAP) in place of DGABC thus conserving natural aggregate sources and reusing an existing product. RAP is produced by milling highway pavements. When used in road projects as a sub-base material large pieces are removed by passing the material through a 211 scalping screen. Material manufacture in this manner was used in 1993 for the Cedar Lane Extension in the Township of Edison, New Jersey.

Various testing was conducted which included the following:

- ☆ Density Tests
- ☆ Sieve Analysis
- ☆ Proctor Tests
- ☆ CBR Tests
- ☆ FWD Tests

The sieve analysis results revealed that the material did not quite meet the DGABC requirements for gradation on the 3/4 and #200 sieves and consequently an alternate specification was developed for the RAP material (see Table 1).

Table 1: Sieve Analysis Results

Sieve	DGABC stockpile (control section)	RAP stockpile (range of results)	NJDOT Spec. for DGABC	NJDOT Spec. for RAP <sup>1</sup>
2		100		100
1-1/2	100	98-100	100	85-100
3/4	84	89-92	55-90	55-90
#4	44	45-50	25-60	25-60
#50	13	5-6	5-25	3-25
#200	9	0.4-3.0	3-12	0-10

Note: 1. RAP or blend of RAP and virgin materials are allowed in the specification.

The proctor and density tests suggested that the material laid on Cedar Road had an optimum moisture content of 6.8-7.0% and a maximum dry density of 116 to 117 PCF. The insitu densities were generally higher (approximate range 120 to 135 PCF) due to the presence of larger coarse aggregate which is normally removed in the laboratory tests.

The CBR tests indicated that the RAP material had a CBR 80% and 30% higher compared to DGABC for molded and 4 day saturation conditions respectively.

Testing with the Heavy (Falling) Weight Deflectometer (HWD) was undertaken to determine the structural condi-

tion of the pavement. Testing was performed on both RAP and DGABC sections.

After performing the back-analysis of the deflection data to obtain the layer stiffnesses it was shown that the RAP layer has approximately 1.6 to 1.8 times greater stiffness compared to the DGABC layer (see Table 2). Figure 1 shows the number of results obtained for ranges in stiffness.

Table 2: Stiffness Results

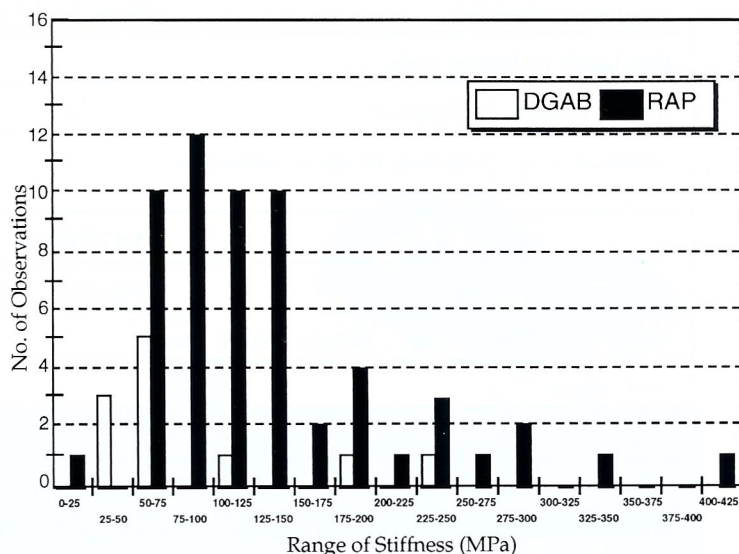
Stiffness	DGABC	RAP	Ratio
50 Percentile (psi)	12,473	20,015	1.60
15 Percentile (psi)	6,092	10,878	1.79

The higher CBR and stiffness values for the RAP material will result in a marginally longer pavement life when this material is substituted directly for DGABC.

Based upon the above results it was concluded that recycled asphalt pavement (RAP) can be successfully used in place of dense graded aggregate base course as an aggregate base course material.

RAP and blends of RAP and virgin materials are currently allowed in the NJ DOT specification. Based on the success of this program studies are continuing on other projects to increase the understanding of this material.

Figure 1: Distribution of Stiffness of DGABC and RAP



## Reference

Frank Palise, "Performance Evaluation of Reclaimed Asphalt Pavement (RAP) as a Dense Graded Aggregate Base Course (DGABC)," Laboratory Investigation 92-2 (File #59-R-332), NJDOT Region 3, Report Submitted to Recycled Materials Task Force, January 26, 1994.

**Orlando A.S.H.E. '96 Conference**  
**"Transportation Challenges - Planning for the Future"**  
June 26-29, 1996

<b>Registration Information:</b> <i>(please print or type)</i>		<b>DATE:</b> _____
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Conference Activities	Fee (per person)	No. of Persons Attending	Total Fee
A.S.H.E. Conference Registration: Prior to 5/1/96 - \$50 After 5/1/96 - \$70			
<b>WEDNESDAY, JUNE 26</b>			
Ice Breaker Reception Registrant Only	No Charge		
Others	\$10.00		
<b>THURSDAY, JUNE 27</b>			
Continental Breakfast Registrant Only	No Charge		
Man of the Year Lunch	\$15.00		
Technical Tour - Orlando-Orange County Expressway Authority & Osceola County Toll Road Tour (AVI)	\$10.00		
Spouse Tour - Historic Winter Park	\$17.00		
Past Presidents' Dinner	\$30.00		
<b>FRIDAY, JUNE 28</b>			
Continental Breakfast Registrant Only	No Charge		
Box Lunch in Exhibit Hall	\$10.00		
Annual Banquet & Reception	\$30.00		
Technical Tour - Seabreeze Bridge Construction Project - Includes Box Lunch	\$30.00		
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Continental Breakfast Registrant Only	No Charge		
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The above fee does not include hotel accommodations. Hotel reservations are the responsibility of each member.

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Note: Registration should be completed by ASHE members only. Spouses and children are not required to individually register.

Special events with extra charges DO APPLY to spouses and children of ASHE members. For example, tickets for other events, e.g., the Ice Breaker event, will cost an additional \$10.00 per each additional family member ticket needed. The exception to this is that spouses registered for the ASHE Continental Breakfast may bring their spouses and children at no extra charge.





# AMERICAN SOCIETY OF HIGHWAY ENGINEERS

## *"Transportation Challenges - Planning For The Future"*

June 26 - 29, 1996

### ASHE '96 Conference, Orlando, Florida

By now, you should have received your registration package for the ASHE '96 Conference. If you have not, please use the form enclosed in this edition of the SCANNER to make your reservations for the conference events. Your accommodations are not included in the conference registration but can be made by calling the Hyatt Orlando hotel at (800) 233-1234. The room rates are \$79.00 double and \$89.00 (up to four) per room. Use the group name, "Highway" when making your reservation.

As a matter of information, the continental breakfast and the session breaks will be held in the Exhibit Hall. We have arranged this at the request of those who are exhibiting at the conference. All too often visitors rush in and out of the exhibit area in an attempt to see it all. At this conference we have added time to visit with exhibitors and gather timely information. Our industry is changing so rapidly that sometimes we can not keep up with new developments. For example, since January 1, 1996, the City of Orlando has seen seven new communications companies. Since the deregulation of telephone/cable television, there have been nineteen new companies filing for franchises within the state of Florida. Please plan to stop and visit with our exhibitors to find out what is new in each field. Also note, professional development hours are credited to those who attend the ASHE '96 Conference.

For those of you who are bringing family with you to the conference, the Central Florida Area has many attractions to consider. Aside from the well known theme parks, which are all within a few minutes from the conference headquarters, there are many other means of spending time and enjoying Central Florida and its diverse activities. For those of you who enjoy cruising the internet, the Orlando/Orange County Convention & Visitors Center offers information under the keyword "Visit Orlando." You can check a calendar of events, preview Orlando's offerings, look at facilities and restaurants, and communicate with the convention and visitor center. The interaddress is: <http://www.goflorida.com/orlando>

You or your travel agent can make airline reservations with USAir at (800) 334-8644, Gold File Number and automobile rental reservations with Avis, 1-800-331-1600, Group Number J624932. We hope to meet and talk with your in Orlando in June!

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# NEW JERSEY 1995 ASHE PROJECT OF THE YEAR AWARD PROGRAM

The North Central New Jersey Section is pleased to report on their newly established annual award program for Contractor's providing roadway construction in New Jersey. This unique competition will provide recognition to Contractors for their special engineering contribution in the performance of a particular project.

To be eligible the project must be a roadway related construction project located within New Jersey in which the CONTRACTOR demonstrated the use of some unique or innovative features such as scheduling, construction techniques, equipment, location and contracting methods to complete project, or design engineering to implement an approved change to the original construction documents. The project must have been completed in 1993, 1994 or 1995, for this initial award program.

The projects were judged and evaluated on the basis of the following three principal criteria:

- CONSTRUCTION METHODOLOGY
- VALUE OF CONSTRUCTION
- CONSTRUCTION SCHEDULING

Entries of a project by a Contractor for this Award Program had the following requirements:

- Entry Form-Naming Contractor, Project, Owner, Designer and Subcontractors
- Summary Description
- Drawings or Graphics
- Photographs
- Credits

This Section's initial effort was rewarded by obtaining five Contractor finalist with exceptional projects all suitable for judging. The awards were announced and presented at the Section's regular meeting on Tuesday, March 5, 1996.

The 1995 ASHE Project of the Year was awarded to Bishop-Sanzari, a Joint Venture, for their grading, paving and structures work on the Southern Mixing Bowl Widening project for the New Jersey Turnpike Authority. This work under traffic widened the toll road from twelve lanes to sixteen lanes in the area just north of the Newark Airport. The Contractor completed the project four months ahead of schedule, developed a unique work-around scheme partly in place of the proposed staging, avoided roadway closings a key safety consideration, completed later stage work earlier, used large cranes for girder erection with only short delay traffic stoppages, utilized slip-form methods for bridge deck and wall construction and utilized wind screens and special cold weather procedures to work through the winter.

The other finalist who each received the 1995 Award of Merit for their entree are:

- George Harms Construction Co. - Route 295/195 Interchange Trenton Complex Sections 7H & 10F
- The Conduit and Foundation Corp. - Route 287 Section 20H and 21H - Wanague River Bridge
- D'Annunzio & Sons, Inc. - Route 287 Section 5U & 4P Route 202/206, including two temporary bridges

- Conti Construction Co., Inc. - Route 287 Section 8N & 9R HOV Lane Construction

Each of the projects submitted by these Contractors illustrated the same commitment to quality and utilization of innovation to advance the Construction to successful early completion.

The Section was very pleased with the completeness of the Contractor's entrees and the complexity of the work they performed. The vital technical expertise utilized by Contractor's during construction is not always given recognition. An Annual Award Program, such as this, is needed to provide a showcase for Contractor's to suitably describe their unique contribution to project engineering. ■



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# NCDOT DESIGN PHASE DRILLED PIER LOAD TESTING

By: Donald O'Toole, North Carolina Department of Transportation

The North Carolina Department of Transportation let its largest project to date in September 1995. This project, located in New Bern, North Carolina, will cost approximately \$120 million, and will widen the US70 bridge over the Trent River, construct a new 1.6 mile long bridge over the Neuse River, construct ten new interchange structures, and perform extensive roadway construction. Scour, ship impact loading, and site geology combined to propel NCDOT's Soils and Foundation Section into "state of the art" drilled pier load testing. During design, a load test program was conducted. The testing program was invaluable because it provided design parameters that resulted in large cost savings, and it also indicated some of the potential problems that might occur during construction.

North Carolina is divided into three physiographic regions: the Mountains, the Piedmont, and the Coastal Plain. New Bern, in Craven county, is in the Coastal Plain. The geology of this area is typically deep alluvial or marine deposits that are underlain or intermixed with cemented sands or limestone. Due to the geology of the site, and the ship impact, scour, and bearing capacity requirements, drilled piers were the most suitable foundation for this project. Until this project, however, NCDOT had only used drilled piers in the Piedmont and Mountains, where residual soils typically overlay weathered rock or hard rock. It was determined that a design phase load test program would be beneficial to develop design parameters for the drilled piers.

Testing was performed on the site during the Summer and Fall of 1994. Two test piers were constructed. One was 48 inches in diameter and 92 feet long, while the other pier was 24 inches in diameter and 40 feet long. To model the design scour elevation, a large (8 foot diameter) casing was installed, and then the Contractor removed 45 feet of soil. The 48 inch diameter pier was then constructed within the 8 foot diameter casing.

The first test performed was an Osterberg load cell test on the 48 inch diameter pier. The Osterberg load cell, similar to a hydraulic jack, was attached to the bottom of the rebar cage prior to placing the cage into the excavation. After the rebar cage was placed in the excavation, the pier was poured according to standard drilled pier construction procedures. The Osterberg test was performed five days after the pier concrete was placed. Since the Osterberg cell was placed at the bottom of the rebar cage, the skin resistance of the drilled pier was being reacted against its tip bearing. The 48 inch diameter test pier failed (4 inches of downward movement) in end bearing at a load of approximately 300 tons. This means the shaft of the pier was also loaded to 300 tons, but it did not fail (there was little or no movement along the shaft.)

Lateral load testing was performed on both the 24 inch and the 48 inch diameter piers at the completion of the Osterberg test. The lateral load test consisted of jacking the two piers against each other up to a maximum lateral load of 75 tons. At the maximum test load the 24 inch diameter drilled pier, which was fully embedded, deflected nearly 3



*The 3,000 ton Osterberg load cell, attached to the rebar cage, prior to being placed in the drilled pier excavation.*

inches. The 48 inch diameter pier, which had an unsupported length of 45 feet, deflected over 8.5 inches at the same load. The lateral load test allowed us to establish valuable lateral design parameters, which in turn enabled us to be less conservative than we would have been if the load test had not been performed.

The tests indicated that the soil and the rock at this site have much greater lateral capacities than we initially predicted.

Statnamic testing of the 48 inch diameter drilled pier was the last design phase load test performed for this project. The Statnamic test consists of positioning reaction masses on a Statnamic loading system, which is mounted on top of the drilled pier. Solid fuel is then ignited in the system's pressure chamber, which accelerates the masses upward providing an equal and opposite force downward on the drilled pier. The Statnamic tests indicated that the 48 inch diameter pier had a shaft resistance of over 1300 tons. Thus, when the tip bearing and the shaft resistance were considered together, the 48 inch pier had a capacity in excess of 1600 tons. These axial capacity results were then used to develop design parameters for the project. A lower safety factor was used during design because of the data obtained from the tests.

Approximately \$300,000 was spent to have the design phase load tests performed. A very low estimate of the cost savings that resulted from these tests is \$10 million. The NCDOT soils and Foundation Section was able to design a more efficient and cost-effective foundation by increasing allowable axial loads (resulting in fewer and shorter drilled piers) and by increasing the lateral capacity (resulting in pile bents replacing post and beam type bents in certain areas.) An unquantifiable benefit of performing the design phase load tests is that some potential construction problems became apparent during the design and specification writing stage. NCDOT may have avoided some significant construction delays or claims because of some critical subsurface information learned during the test program. The expenditure for the design phase load tests was money well spent. ■



*Gravel being placed around the 3,370 ton Statnamic testing device. The rocket-like object protruding through the gravel container is the silencer.*

# CHANNEL BRIDGE SYSTEM EVALUATED BY HITEC

By: C. W. Sowell, P.E., Harrisburg Section

The introduction of new technology to the highway community usually requires demonstration of the new product to many state highway agencies. To facilitate a nationally accepted performance evaluation of new technologies and bring the advances to the national system efficiently, FHWA and AASHTO cooperated to establish the *Highway Innovative Technology Evaluation Center* (HITEC) in 1994. One of the first new technologies to be evaluated is the channel bridge system.

The channel bridge is comprised of a single transverse slab supported by two longitudinal edge beams. The deck is constructed using precast segments about eight feet (2.5m) long consisting of the slab, edge beam, transverse post-tensioning (and sidewalk where required) so that no concrete is cast in place. The deck is longitudinally prestressed with two sets of tendons: one set inside the slab and the second in the edge beams. The longitudinal edge

beams also act as parapets.

The channel bridge offers certain advantages over conventional short span systems:

- **Construction Time.** HITEC estimates replacement of an existing overpass is possible in about 100 calendar days as compared to up to 18 months for a conventional bridge.
- **Increased Underclearance.** The distinctive feature is the edge beams which support the bridge above the deck, similar to a through girder. Replacing an existing structure with the channel bridge could increase underclearance two to three feet without raising the approach grades.
- **Life Cycle Costs.** Because fewer bearings are required maintenance costs could be lower. Painting is unnecessary and permeability is low.

Since 1990, seven of these bridges have been constructed in France. One was inspected as part of the HITEC evaluation. The bridge handles relatively low traffic and had experienced one winter. The deck is protected with membrane waterproofing, an asphalt wearing in the course and a sheet resin material. The inspection noted no visible cracking in the asphalt pavement over the segment joints or at the deck/edge beam interface.

Results of the full investigation will be presented in a later report that will be available through the Civil Engineering Research Foundation (CERF). ■

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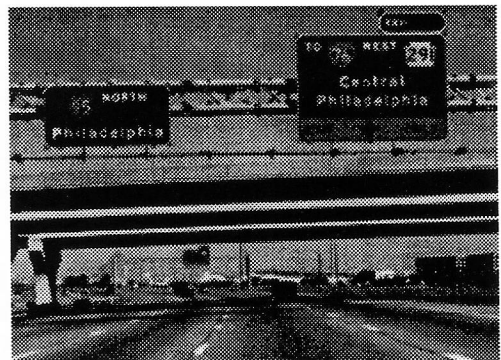
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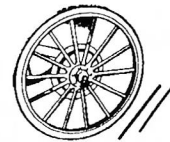


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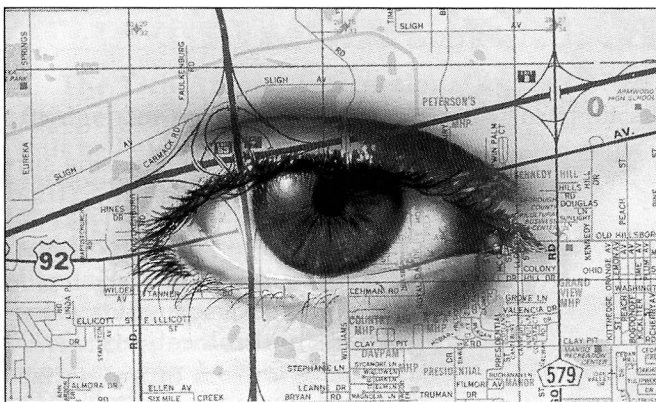
Robert G. Prophet joins Traffic Planning and Design, Inc. Mr. Prophet is a graduate of Drexel University in Civil Engineering and specialized in highway, signal and drainage design. He is a member of the Delaware Valley Section of ASHE. TPD also announced the addition of D. deMenna and A. Dougherty to the firm.

## ALTOONA SECTION AWARDS SCHOLARSHIP

Gregory C. Replogle of Johnstown, Pennsylvania, received the annual \$1,000 scholarship award presented by the Altoona ASHE Section. The award was presented at Altoona's annual banquet in March.

Mr. Replogle, a junior at the University of Pittsburgh at Johnstown, is a Civil Engineering Technology major. He has a 3.80 GPA and has been named to the Phi Eta Sigma Freshman National Honor Society.

In addition to his studies, he has served as an engineering intern for the Pennsylvania Department of Protection.



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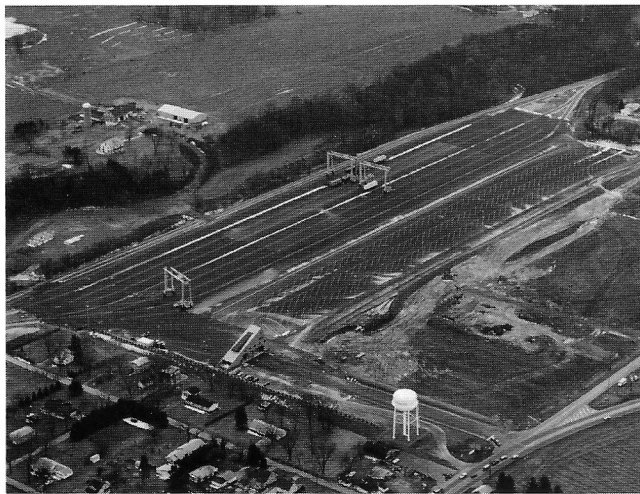
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# NEOMODAL TRANSPORTATION FACILITY COMPLETED IN OHIO

On July 7, 1995, a groundbreaking ceremony was held on the site of the new Neomodal Terminal in Stark County, Ohio. Federal rail and highway officials got together with State Transportation officials, State Development officials, Stark County elected officials, political entities and businesses to celebrate a unique partnership which oversaw the development of this facility. The \$11.2 million transportation project created a facility where truck transported trailers and containers are loaded on and off railcars for long distance shipping. The interface of these two transportation systems translates into cost savings for goods hauled around the country.



The project began on November 22, 1994, at a meeting in Columbus, Ohio between the Stark Development Board, the Ohio Department of Transportation and officials from the Federal Highway Administration. It was agreed the Stark Intermodal Facility would be owned by the Stark Development Board, and a private operator would be selected to run the freight terminal.

In order to facilitate the process, a management team was put together by the Stark Development Board to oversee all aspects of the project. The team included representatives of ODOT; the Stark County Commissioners; Wheeling & Lake Erie Railway Company; Massillon Development Foundation; Stadelman & Associates; Krugliak, Wilkins, Griffiths and Dougherty; and the Stark Development Board. This team selected Hammontree and Associates to lead the design team, under the direction of Stadelman & Associates (project manager), and with the assistance of Chuck Burroughs (Vice President of engineering for Wheeling & Lake Erie Railway Company), Harris-Day Architects (project gate house architect), and Custom Technologies, Inc. (operations and gantry crane designers). The challenge the design team faced was to complete the Intermodal design, obtain approvals and construct the facility within one year. This task had never been accomplished in the private or public sector in the United States.

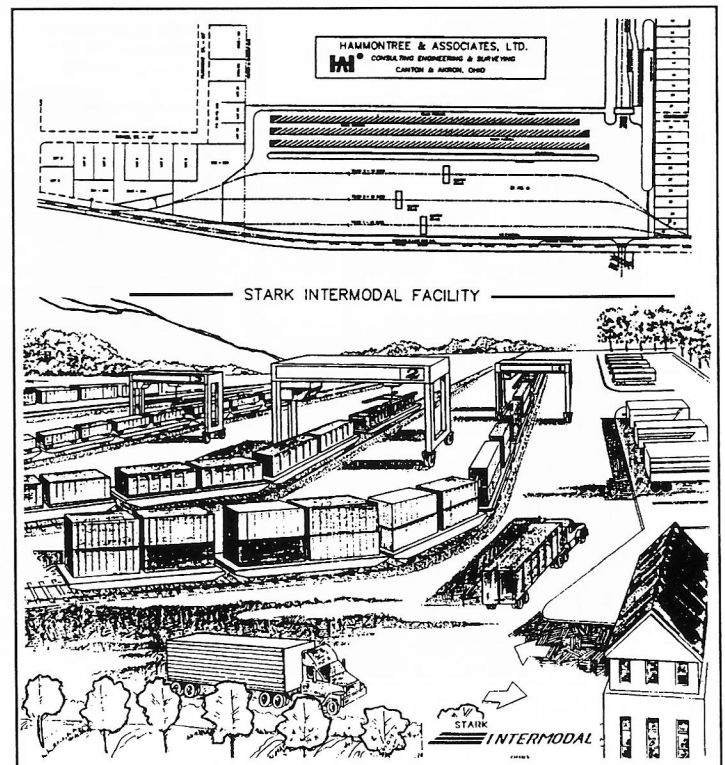
Hammontree & Associates was responsible for the design and approvals of the civil works package. Before authorization to proceed with final design was granted by the State Controlling Board, environmental impacts had to be addressed. Clearances for hazardous waste, wetland impacts and historical properties had to be granted from ODOT, the Federal Highway Administration, State Historical Preservation Society, U.S. Army Corps of Engineers and Ohio EPA. Local permits included rezoning the project site from residential to industrial district in Perry Township, which also required Stark County Regional Planning Commission approval.

The civil works design was completed by integrating the ideas from all the members on the design team. After Hammontree Engineers obtained the environmental clear-

ances and completed the surveying and mapping, final design commenced. The civil works design package included 26 acres of paving, traffic control, drainage, utility extensions and relocations, 12,000 linear feet of new railroad track, new traffic signals at the entrance of the facility, structural engineering for the gate house and box culvert, and over 300,000 cubic yards of earthwork. Hammontree Engineers were also responsible for coordinating the geotechnical design by BBC&M Engineering, Inc., and the electrical and lighting design by Electro-Mech Engineering, Inc.

The design team's involvement on the project did not stop at the completion of the design. They also conducted the bidding process, evaluated the bids and were responsible for construction management and observation. Beaver Excavating was awarded the contract to construct the facility in June of 1995 and the first revenue cargo was received in the NEOMODAL TERMINAL during January of 1996.

The design team is very proud to establish a new standard for efficiency in execution of high technology projects involving Federal and State funding. The team met the challenge of an aggressive schedule, complex design, and stayed within the budget constraints. One aspect of this project is that local companies were called upon to design and construct the facility. This enabled a spirit of cooperation not found in most projects.







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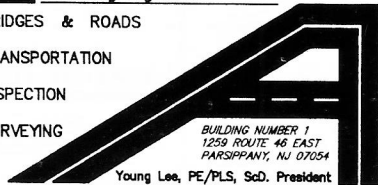
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