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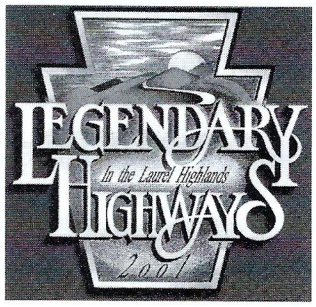
SCANNER

NEWSLETTER OF THE AMERICAN SOCIETY OF HIGHWAY ENGINEERS

2001 - 1

ASHE 2001 NATIONAL CONFERENCE



June 7 Through June 9

At The Seven Springs Mountain Resort In Western Pennsylvania

www.ashe-southwestpa.org

The Southwest Penn Chapter is inviting all ASHE members to the ASHE 2001 National Conference from June 7 through June 9. The conference will take place at the Seven Springs Mountain Resort in the majestic Laurel Highlands of Western Pennsylvania. Seven Springs is located one hour east of Downtown Pittsburgh and just fifteen minutes off exit 9 or exit 10 of the Pennsylvania Turnpike (I-76) in Champion, Pennsylvania. Visit our website at www.ashe-southwestpa.org for conference and accommodations information.

The Conference schedule is full of activities for members and their families. Industry experts will present technical sessions discussing a variety of informative topics. Exhibitors from various companies and organizations will be on hand to make presentations and answer questions regarding their products and services. Mr. Michael M. Ryan, P.E.,PennDOT Deputy Secretary for Highway Administration, will be the keynote speaker at the Annual Meeting.

Guest and family activities will focus on nearby destinations that truly showcase the beauty of the Laurel Highlands. Trips to Ohiopyle State Park offer thrilling whitewater rafting or leisurely biking on the park's riverfront trail. If you and your spouse prefer a more leisurely pace, The Mountain Playhouse and Green Gables presents a summer stock theater production in the charming playhouse preceded by lunch at the historic Green Gables restaurant. One of Frank Lloyd Wright's most famous works, Fallingwater, is the third destination planned for the Conference. This architectural marvel nestled in the Laurel Highlands was designed as a private residence for department store magnate Edgar J. Kaufmann. The group will enjoy lunch and gift shopping at the Summit Inn with a spectacular view overlooking a ten county area. Log on to www.ashe-southwestpa.org for more exciting activities to be announced in the upcoming months.

All three nights at the Conference promise a sensational finish to the day's activities. Thursday night will feature the Icebreaker Reception including a complimentary full course barbecue dinner and entertainment by members of the band Deja-vu. Friday night features the famous Seven Springs seafood buffet dinner followed by Las Vegas style entertainment. The ASHE 2001 Annual Banquet will be

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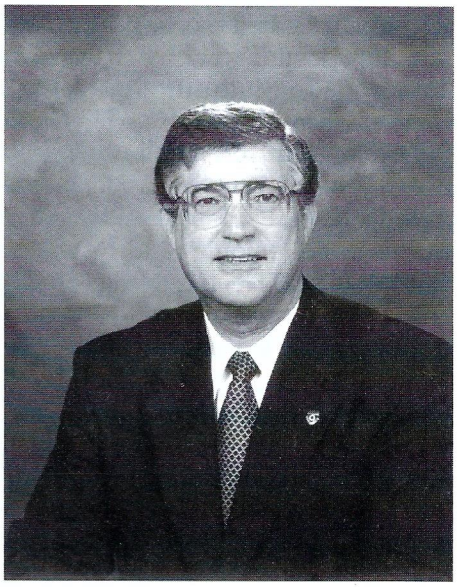
Delaware Valley Engineer of the Year Named



Past National President, Pat Dougherty was elected the Delaware Valley Engineer of the Year by all of the Engineering Technical Societies in the Philadelphia Area. Pat takes over as Chairman of the Delaware Valley Engineers Week Council in February and is charged with directing the events included in the celebration of Engineers Week in the Greater Philadelphia Region. Pat was nominated by the Delaware Valley Section of ASHE and won the election on the first ballot.

Goals for Engineers Week include:

- Informing the community of the contributions Engineers make to the quality of our lives.
- Acquainting young people and guidance counselors with the opportunities and rewards of a career in engineering.

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National Board News

National board members met for a regular board meeting on January 26, 2001, at the Ramada Inn in New Stanton, Pennsylvania. National President Domenic Piccolomini presided over the meeting. The following are highlights of the committee reports and board actions:

Membership:

There is an increase of 53 members since the October 2000 meeting, Secretary Conner reported. Total membership in ASHE now stands at 5,136.

President's Report:

President Piccolomini attended ASHE section meetings and dinner events including Pittsburgh, Altoona, Mid Allegheny, Southwest Penn and Franklin. He participated in the Region 1, Annual Luncheon and board meeting held in Columbus, Ohio. Also, he participated in judging of the Annual PQI Awards that will be presented at Pennsylvania's Transportation Industry Spring Conference to be held at Hershey, Pennsylvania in March 2001.

A highlight of Piccolomini's activities included attendance at the North Florida Section's charter dinner meeting in Tallahassee, Florida. President Piccolomini conducted the chartering ceremonies and installed the new Board. The Charter was presented to their President, David F. Snyder and, Tom Barry, FDOT Secretary, spoke on issues facing the Department of Transportation.

New Sections:

First Vice President Cooper Curtis reported that the North Florida Section was chartered on January 11, 2001, with 41 members in attendance. Many other interested areas have been identified and prioritized to expand existing regions.

Director Ron Purvis is compiling information for a PowerPoint presentation to aid in the start-up of new sections. He requests assistance by providing materials of interest that will help in promoting ASHE.

Conference Committee:

David Jones presented the new "National Conference Guidelines" which were reviewed by the board and adopted upon discussion and minor modifications. Some of the highlights include: a request to host the conference must come from the region no more than five years in advance; the conference should be affordable to encourage member attendance; the first $10,000 in conference profits remain with the host region, while the amount over $10,000 will be split between the host region and national; and, advance startup funds up to $3,000 will be available from national depending on financial need.

Director Frank Lopez presented a written request from Region 3 endorsing the Pittsburgh Section's desire to host the National Conference in 2005. The board approved this request.

Ethics & Practice Committee:

Secretary Conner lead discussion on ASHE's membership in IACET to provide CEU's for conferences, workshops and technical training provided by ASHE sections and regions. Upon approval of the board, ASHE will continue registration with IACET.

Web Site Committee:

David Jones discussed the redesign of ASHE's web page that is being done through John Wanner's executive services contract. Some of the features include: complete redesign of the home page; link to the national conference web page; FAQ page to handle queries to ASHE; Section's Operating Manual; ASHE Strategic Plan; national map & local sections links; and, organization links page.

Student Sections:

Second Vice President Sandy Ivory is collecting information on what sections are doing to promote student interest in the highway industry. There is much activity including high school visits, scholarships, Engineers Week activities, etc. This project will result in a future guidance document in the "Section's Operating Manual". Ivory also reported there is some interest in establishing a scholarship at the National level.

Nominating Committee:

Immediate Past President Charles Flowe announced the following slate of officers and directors for the 2001-02 ASHE year:

President	Cooper E. Curtis, P.E.
1st Vice President	Sandra K. Ivory
2nd Vice President	David W. Jones, P.E.
Treasurer	Robert E. Yeager, P.L.S.
Secretary	Terence D. Conner, P.E.
Director – 1 year	
Region 7	Ronald L. Purvis, P.E.
Region 8	Tracey L. Hill, P.E.
Region 9	John M. McDowell, P.E.
Director – 2 year	
Region 1	Robert A. Hochevar, P.E.
Region 2	Shirley A. Stuttler
Region 3	Frank S. Lopez
Director – 3 year	
Region 4	Robert M. Peda, P.E.
Region 5	pending
Region 6	Richard Prentice, P.E.

Unfinished Business:

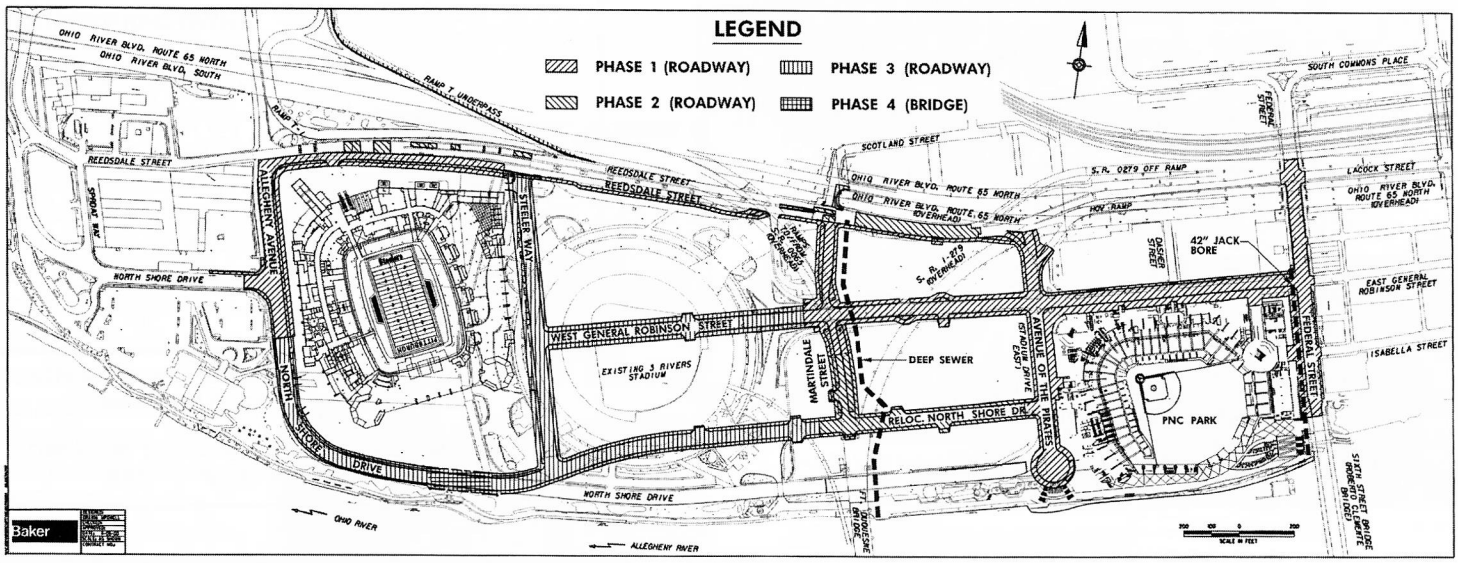
Secretary Terence Conner discussed unpaid section assessments for 2000/01 that were due by October 1, 2000. A motion was made and carried to include a 10% late charge on future assessments that are not paid by the established due date. Such notice will be made a part of future invoices. ■

NORTH SHORE INFRASTRUCTURE – IT'S MORE THAN NEW STADIUMS

by Geoffrey B. Nara, P.E., L.A. Pittsburgh Section

Several new jewels are rising on the Pittsburgh skyline, with their construction adding to the excitement of an already vibrant city. Two that get a lot of attention as they take shape on the North Shore, across the river from the city's central business district, are the new Pirate's baseball field, PNC Park, and the new Steelers Stadium for football. It's easy to loose sight of the other critical engineering efforts going on at ground level, the North Shore Infrastructure Project.

Initially, all the roadways in and around the site were developed as a single project. As the plans progressed, it became apparent that to accommodate existing traffic and construction of the new stadiums, the roadway system as initially planned would be inadequate. Furthermore, the existing system did not provide sufficient space for the park improvements proposed along the riverfront. The plans were subsequently developed as four separate construction phases, each to address specific construction sequencing.



The project encompasses all roadway, utility, and infrastructure improvements associated with construction of the new sports stadiums. But it needed to be more than that. The North Shore infrastructure work is intended to extend Pittsburgh's downtown area across the Allegheny River to include the North Shore. Streets, sidewalks, lights, trees and utilities are integrated into the designs, intended to expand the downtown area across the river and to provide for future development of the site between the new stadiums. Project amenities include granite curbs throughout the project, brick cross walks, decorative pedestrian and street lighting, and the use of various species of trees to accentuate the new facilities and provide mixed fall coloration throughout the project.

From the outset, the project was a coordination challenge. In addition to the existing surface streets, which were to be modified for the new sports facilities and planned future development, elevated approaches to several linked highways cross the site on overhead structures. Underground are existing electrical duct banks servicing the city, water, sanitary and storm sewers, and thermal lines servicing the existing Three Rivers Stadium, in addition to all the new utilities servicing the new stadiums. Two 120" sanitary sewers cross the site, one 30' deep brick sewer (constructed around the turn of the century) and the other 120" sewer which was tunneled approximately 100' deep, crossing nearly under an existing pedestrian underpass structure. Adding to the challenge, an ongoing improvement to Pittsburgh's riverfront parks along the Allegheny River in the project area needed to be accommodated in the designs.

- Phase 1 was developed to accommodate the opening of PNC Park on March 31, 2001. A new connector street, perpendicular to the river, was added to the infrastructure to provide traffic relief for closure of existing roadways during future construction phases.

- Phase 2 was also designed to accommodate the opening of PNC Park. Phase 2 included relocation of the main circulation roadway around the stadiums, North Shore Drive, further north away from the Allegheny River through an existing parking lot to provide room for the riverfront park. It was also critical to the schedule to relocate the roadway in advance of riverfront park construction for the opening of PNC Park.

- Phase 3 consisted of the roadways around Steelers Stadium and through the existing Three Rivers Stadium. This section was realigned to provide room for a future "great lawn" area adjacent to the Allegheny River near the new Steelers Stadium, adding to the riverfront park feature. Another key roadway was also realigned to provide space for a future amphitheater. This section was designed, from preliminary through final design in three months, to accommodate demolition of Three Rivers Stadium in early 2001 and opening of Steelers Stadium in August of 2001.

- Phase 4 is a pedestrian underpass structure carrying North Shore Drive over the pedestrian walkway from the riverfront park to the new Steelers Stadium. The structure was initially a single span structure that evolved into a three-span steel continuous multi-w-beam structure. The beams are sized and the steel details along the parapets were designed to match the steel shapes used throughout the Steelers Stadium. In addition, the skew angles of the abutments as well as the piers vary based on splay lines from the center of the stadium. The structure is clad with stone veneer matching the stadium. Phase 4 was designed to accommodate the construction schedule of the bridge, to be opened by the first Steeler game in the new stadium in August 2001.

Three separate sewer projects were bid: one sanitary project and two storm projects. The sanitary sewer project involved placement of deep sewers, a portion of which were jacked and bored from a downshaft along the Allegheny River. A 42" storm sewer was jacked and bored nearly 700'. Another advanced storm system connected an existing outfall to the Allegheny River, with the new roadway system designed to accommodate construction of a stormwater detention basin required for demolition of Three Rivers Stadium.

As with any project of this magnitude that also has an extremely aggressive completion schedule, total commitment is required by all parties. The City of Pittsburgh Department of Engineering and PennDOT District 11-0 especially deserve tremendous recognition for cooperating and providing timely reviews and approvals, enabling the project to move ahead on schedule.

Although the two stadiums get nearly all the attention, significant effort is being spent to ensure that construction proceeds smoothly, that sports fans will have good access to the facilities, that utility service meets all the user's needs, that the new riverfront park improvements will be able to be enjoyed year-round, and that all these pieces "fit" together. The North Shore Infrastructure Project does all this successfully. People *will* notice this extension of downtown Pittsburgh.

With thanks to Michael Baker Jr., Inc. for their support and information in the development of this article.

SW Penn Section Offers Scholarship

The Southwestern Pennsylvania Section is sponsoring a scholarship for 2001. The scholarship competition is open to students whose home residence is in the counties of Fayette, Greene, Washington, or Westmoreland, PA. Additionally, the student must be entering at least the third or fourth year of a Civil Engineering curriculum. For more information, please contact Donald W. Herbert, P.E., Scholarship Committee Chairman, at 724-439-7287 or dherbert@dot.state.pa.us.

Safety in the Work Zone

by Don A. Felicella, P.E., ACTAR, and Donald J. Felicella, ACTAR
Felicella Consulting Engineers, Inc., ASHE Gold Coast Section

Safety in the work zone is an issue that should be of concern to everyone associated with highway design, highway construction, maintenance of highways, and/or any other associated type work.

Every year thousands of people are involved in traffic crashes that occur in work zones. According to the National Work Zone Safety Information Clearinghouse, work zone crashes have resulted in a annual average of 700 to 800 deaths and thousands of injuries, not to mention the economic cost, which exceeds $3 billion per year. Many of these crashes can be attributed to either improperly maintained or improperly placed traffic control devices. We must all be aware that improperly placed or incorrectly used traffic control devices can cause injury or death and lead to liability lawsuits.

The legal liability of governmental entities and their representatives in the area of public safety has changed significantly in recent years. Federal regulations mandate minimum standards for public safety within work zone areas. Such standards and regulations include the *Manual on Uniform Traffic Control Devices* (MUTCD). The MUTCD was adopted as a national standard pursuant to the authority of the Federal Uniform Code. The Federal Code has a provision which sets forth for the adoption of the MUTCD on a state level. Many states, by way of statutes, mandate that the Department of Transportation adopt a uniform system of traffic control devices for use on the streets and highways, i.e. the MUTCD. Many local municipalities have also adopted the MUTCD in some form or another, some knowingly and some not so knowingly. Some local municipalities will adopt their state's roadway design standards, which are actually dictated by the MUTCD. This can lead to unknown liability on municipalities, counties and engineering firms, not only for contributory negligence on the placement of traffic control devices, but also for improper training of those individuals in charge of the proper and safe placement of these devices in work zones and road maintenance. With the cited trends in place, it is incumbent upon the responsible governmental entity by way of their employees and/or representatives to implement these standards and regulations.

While we all need to be concerned about the legal aspect of a lawsuit, we must be more concerned about the safety of both the general public and the workers. By concentrating on this area, the concern about legal actions will be reduced. Two areas of work zone safety that are all too often either overlooked or not properly addressed are taper lengths and pedestrian traffic.

Taper Lengths: A common error is having too short of a taper length when channelizing devices are being used to redirect traffic flow. We must always remember that the function of channelizing devices is to provide a smooth and gradual transition in moving or redirecting traffic from one lane to another or for lane reduction. This should be done in such a way to provide a safe, smooth vehicular movement through the work area and provide a "safe" zone for workers and equipment. Remember, before a driver can slow and/or stop the driver must go through a perception-response phase, which includes the time the driver needs to see and recognize the traffic control devices and the time needed to respond to such devices. Even though the MUTCD provides minimum taper lengths, each situation should be reviewed in the field in order to determine if such lengths should be made longer. If vehicles are hitting their brakes and skidding, an evaluation of taper lengths may be in order.

Pedestrian Traffic: Have you ever heard the saying "children are people too"? Well, "pedestrians are traffic too". When a sidewalk is removed or work is being performed in area of pedestrian traffic, an alternative route for this traffic must be provided. I recently saw a sign which read "Sidewalk Closed" on a busy multilane road where some sidewalk work was being done. There was no alternate sidewalk, no safeguard for the pedestrian, and no advance warning. Have you ever see a sign abruptly placed on a road indicating "Lane Closed"? If a pedestrian is forced to walk in a traffic lane where a sidewalk is closed and is hit by a vehicle, even if that individual is intoxicated, you will probably find yourself involved in a lawsuit. Consideration for alternative pedestrian routes must start at the design stage of the Traffic Control Plans (TCP), and if overlooked in the TCP, the contractor is obligated and liable to make the necessary provisions for such a safe alternative pedestrian route.

Many of us have become complacent. We have been involved in numerous design and maintenance projects, or relocated countless miles of utilities, and we feel that we no longer need to read and digest the plans, specifications, special provisions, standards or any other of the associated "paper" aspects of the project. Wrong!

These and other documents define and detail our responsibilities and obligations, not only to the contracting agency, but also to the general public and our workers. These documents also detail the obligation and liability of individuals and/or entities when there is an accident within the work zone.

Some of the common language which provides the basis of our liability is found in the following documents: *State Standard Specifications* as it relates to the authority of the Engineer, and under the Maintenance of Traffic and in the sections pertaining to the Installation of Traffic Control Devices; the *Manual of Uniform Minimum Standards* with reference to a comprehensive plan for work site safety being required and that work site safety shall include provisions for the safety of motorists, pedestrians and workmen; the *State Construction Manual* with reference to the responsibility of the project engineer to see that the contractor provides the necessary safety devices and uses them in the required manner. The statements and references are endless. Read them and re-read them because the accident reconstructionist, other experts and attorneys will.

Accident reconstructionists consider certain factors in determining the cause of an accident or crash, such as driver, vehicle (mechanical), and roadway design features. In a work zone accident, you also have traffic control devices and their placement, or lack thereof, and the entity or entities responsible for such placement.

If one reads the many documents associated with a project, whether project specific or by reference, one will realize that the umbrella of liability covers all of us. To keep us from this unwanted rain of liability we must all think Safety in the Work Zone from the design stage to the final cleaning of the project. ■

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USE OF WETLANDS FOR STORMWATER TREATMENT

By: Johnny Martin, PE & Tim Reid, PE
Moffatt & Nichol Engineers, Raleigh NC

Moffatt & Nichol Engineers was contracted by the Town of Emerald Isle to model the drainage characteristics of the southern tip of the coastal barrier island and find an acceptable solution to treating floodwaters that occur after major storm events. This was necessary due to changes in environmental regulations governing how the Town could remove the floodwaters. The study area is comprised of interior dunes and troughs that direct all runoff toward a single outfall located on the southwest end of the island. The entire area is heavily developed and the natural trough system has been interrupted by the development of roads across this natural trough. Fecal coliform is the major contaminant of the stormwater due to residential wastewater treatment systems that are mainly septic tanks with shallow leach fields. The complexities involved with hydraulics and environmental issues on a coastal barrier island along with the physical infrastructure constraints provided the challenge to design a viable solution.

Discussions with environmental agencies and residents gave us the parameters required for an acceptable solution. These parameters are: improve water quality, install with a minimum of disruption to the community, permitted by environmental agencies, little or no opposition from the community or other agencies or groups, and no adverse affects on the beaches or sound.

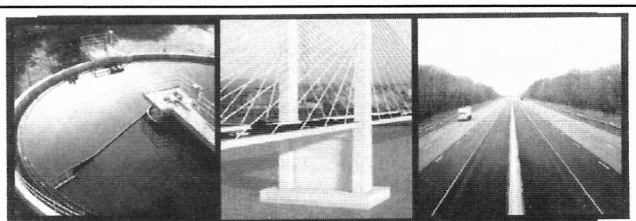
Only the solutions that meet these requirements would be studied in detail. The possible solutions included gravity feed through pipe systems, ocean outfall, aquifer storage and recovery (groundwater injection), packaged treatment station, land based infiltration / treatment, and the do nothing alternative. After evaluating each of the alternatives using the criteria listed above, the land/based infiltration/treatment system was chosen as the only solution that met all of the stated parameters.

The use of constructed wetlands/infiltration basins is a recognized method for treatment of stormwater in North Carolina, and therefore, the use of existing wetlands is the option with the best chance of being permitted in this case. This type of treatment system allows for many of the contaminants in stormwater to be effectively removed from the flow by natural means. The vegetation helps to remove phosphorous and nitrogen while the vegetation also slows the flow to allow sediments to settle. Downward percolation through the soils also removes additional contaminants and enteric bacteria. Fecal coliform removal efficiencies exceeding 90% have been reported from constructed wetlands. The multiple filtering of the runoff through sand filters and vegetated bays and then through the marsh grasses located at the edge of the property prior to entering the sound should yield similar results.

This option had no opposition from the Division of Water Quality or The Division of Shellfisheries. The Division of Water Quality also expressed a desire to work closely with the Town if this option was utilized to serve as a model solution for other coastal communities. The North Carolina Coastal Federation also preferred this alternative since it would require the acquisition of large tracts of coastal property which would preserve open space and wildlife habitat. Also, since large areas are required to effectively treat the storm water, there was a good chance that the Town could derive a secondary low impact use such as a park at the site. The transfer mechanism to get the stormwater to the treatment area consisted of a series of lift stations and forcemains.

As for design concerns, the proposed project was designed to temporarily store runoff in existing shallow, vegetated pools and depressions that will allow nutrient uptake and removal of urban pollutants. The infiltration area also had to be large enough to accept large quantities of water without adversely affecting nearby property owners (through surface flooding or amplification of groundwater levels). The treatment area would also need to be high enough to eliminate the possibility of a direct discharge during a storm surge. To answer these and other questions, Moffatt & Nichol Engineers developed a coupled surface-water, groundwater model. This model allowed the engineers to view the affects of surface and sub-surface flow on the proposed design. This also provided the guidance required to adequately size the small dikes and other perimeter elements to prevent impacting the nearby residents.

Another important factor to consider during design is that both the current plant and wildlife species may be impacted by the altered hydroperiod. These effects must be studied and quantified to verify that impacts will be minimized. In our case, the design allows a more complete wetland system to be developed and maintained due to the ability to hydrate the system throughout the year. The project is currently waiting funding for construction. ■



MAHONING COUNTY BRIDGE RECEIVES AWARD

John E. Alexandrou, P.E., Transportation Department Manager
CT Consultants, Inc.

The Cemetery Bridge (White Bridge) over Yellow Creek in the Village of Poland recently received the Outstanding Rehabilitated Bridge Award from the Association for Bridge Construction and Design. Honored were Richard A. Marsico, P.E., P.S., Mahoning County Engineer, John E. Alexandrou, P.E., Transportation Department Manager for CT Consultants, Inc., Soda Construction Company and the Village of Poland.

This single span, bowstring arch bridge, with truss elements, was constructed in 1877 by the renowned Wrought Iron Bridge Company from Canton, Ohio. The bridge carried vehicular traffic over Yellow Creek in the Village of Poland until its closure in 1984. The "Historic American Engineering Record" prepared by Frances A. Jones for the National Park Service states that the Cemetery Bridge "is the only known example in Ohio of William Rener's patented oval wrought iron tubular arch design. Only two examples are known to exist in the United States . . ." The bridge was listed on the National Register of Historic Places in 1983.

The existing bridge deck is 126'-7" long x 18'-2" wide between two wrought iron arches. The arches are composed of two semi-elliptical sections, riveted to a flat plate. The lower chords are composed of a pair of continuous plates (suspended from the arches with star-shaped vertical tension hanger rods) which support the floor system. There are fourteen panels between arches and bottom chords, of which twelve are crossed by two diagonal rods. Unique cast iron saddles are in place for connecting the hanger rods and diagonals between the arches and bottom chord plates. The lower chord plates taper down into threaded rods at their extreme ends as they pass through a patented cast iron bearing shoe. The shoe also receives the end of the arch section. The floor system is composed of six longitudinal rolled beam stringers which bear on thirteen king-posted floor beams. Lateral bracing rods, in the plane of the bottom chords, are attached to the ends of the floor beams. The stringers support galvanized steel floor pans filled with asphalt. Above the deck, overhead bracing is at three panel points consisting of angles spanning between arches and diagonal bracing rods with an x-pattern between. The bearing shoes and stringers are supported by the original sandstone abutments constructed in 1877.

Upon the closure of the bridge, a committee of citizens from the Village of Poland began working with the Mahoning County Engineer's office and the Ohio Historical Society to initiate an historic restoration of the structure.

CT Consultants, Inc. performed an in-depth visual inspection of the Cemetery Bridge between November 8 and November 17, 1995. All members were field measured for use in the rating analysis calculations. The following major deficiencies were found:

- The stringers were in critical condition. Holes through their webs warranted total replacement.
- The king-post tension rods had significant necking at their connection with the floor beams (generally 50% to 60% section loss). Floor beam 12 had one rod missing.
- Lateral bracing rods, in the plane of the arch lower chord, had necking at their connection to the floor beams (about 33% section loss).
- The diagonal tension rods in the truss arch were in critical condition due to necking at the lower connection points (generally 40% to 67% section loss).
- Several cast iron saddles on the arches were cracked.

- The sandstone subgrade supporting the east abutment was highly jointed. Weathering resulted in dislocation of the rock an average of 12" behind the face of abutment and 18" under the bottom course of sandstone blocks.

The rating analysis determined major steel replacement was needed for the bridge to be re-opened for pedestrian and bicycle traffic. The following items were incorporated into the rehabilitation plans:

- Total deck surface replacement with 3" x 6" plank wood floor (wolmanized southern yellow pine).
- Replacement of six stringers with six continuous W10 x 12 stringers.

- Total replacement of 26 floor beam king-post rods with new 1" diameter A36 steel rods.
- Replacement of 15 one inch diameter diagonal rods and 11 U-bolts at the rod intersections.
- Replacement of two king-post struts.
- Replacement of five saddles at the connections of the diagonal elements to the arch. Replacement of four saddles at the connection of the vertical element to the arch.

- Replacement of 17 saddles bearing on the lower chord plates for the vertical tension hanger connections to the lower chords.

- Miscellaneous repairs to wrought-iron superstructure elements.
- Removal of pack rust, sandblasting and field painting of all new and existing superstructure steel.
- Removal of existing W-beam guardrail from the bridge and replacing it with 2-1/2" I.D. pipe railing connected to the arch verticals with U-bolts. Rail to conform to AASHTO pedestrian rail requirements.
- Refurbishing the existing sandstone block abutments including repointing the mortar joints, capping the blocks with a reinforced concrete seat and backwalls, and constructing a reinforced concrete fill to repair undermining of the forward abutment.

The completed plans were submitted to the Ohio Historical Society. Their comments assured that the historically unique aspects of the structure would be saved for future generations.

With a federal grant from the ISTEA Transportation Enhancement Fund, the Cemetery Road Bridge Restoration was undertaken in 1999 by ODOT, the Mahoning County Engineer and the Village of Poland.

Soda Construction from Niles, Ohio began the restoration in August and completed the project in November.

At a ribbon cutting ceremony on November 18, 1999 ownership of the Cemetery Bridge was transferred from Mahoning County to the Village of Poland. ■

Continued from page 1

held on Saturday, followed by the live entertainment of The Fabulous Hubcaps, recognized as one of the greatest "oldies" bands in the country.

The Seven Springs Resort offers tennis, golf, nature walks and hiking, mountain biking, swimming, horseback riding, alpine slide, beach volleyball and many other resort activities. And of course, the annual ASHE golf outing will be held on the resort's picturesque 18-hole golf course.

For the most up to date conference information visit our website at www.ashe-southwestpa.org. Registration packets will be mailed to all members in April.

The ASHE 2001 National Conference is the perfect place to get away for a long weekend of fun and relaxation. The Southwest Penn Chapter hopes to see you and your family June 7 through June 9! ■

Continued from page 1

- Recognizing exceptional engineering achievements, outstanding math and science teachers and students and a Young Engineer and Engineer of the Year.

Pat has over 34 years of experience in both the public and private sector working in the field of civil/transportation engineering in the Delaware Valley.

Born and raised in West Philadelphia, Pat attended St. Thomas More High School and received his Bachelor of Science degree from Villanova University in 1968, followed by a Master's degree in Transportation Engineering in 1975. He began his career working as a summer co-op for the Pennsylvania Department of Highways. After graduation, he continued working for the state Department of Transportation (PennDOT) in the five-county Southeastern Pennsylvania region.

Pat left government service in 1976 and served in positions of increasing responsibility at several local consulting engineering firms. He is currently the manager of the Highway Design Division of McCormick, Taylor & Associates, a Philadelphia based firm, where he is responsible for numerous projects with a total estimated construction value of over $100 million.

In addition to his notable professional career, Pat is an active member of the American Society of Highway Engineers (ASHE), the American Society of Civil Engineers (ASCE), and the Institute of Transportation Engineers (ITE). He is a George Washington Associate Member of the Engineers Club of Philadelphia.

Pat was appointed to ASHE's Delaware Valley Section Board of Directors in 1981 and became Section President in 1985. He was appointed to ASHE's National Board of Directors in 1990 and served on numerous committees, chairing the Technical Committee and assisting in the development of the National Long-Range Plan for 1995-2000. In 1997, he was elected National President of ASHE. He continues to serve on several Board Committees. He was presented with ASHE's National President's Award for his outstanding and continuing service to the Society at the 2000 National Conference.

Pat was responsible for providing ASHE's initial support and participation in Engineers Week Council. As a representative of ASHE he has served on the Council in various roles including Chairman of the Events Committee, Council Secretary and Assistant Secretary. He currently serves on several Council commitees.

Pat has served the community in many ways, most notably by volunteering his time and engineering skills for community projects. On one such effort, he served as the Engineer for the reconstruction of the fire-damaged historic Schofield Ford Bridge in Tyler State Park. The project was cited by both the Commonwealth of Pennsylvania and the ASHE Delaware Valley Section for the Project of the Year honors.

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IMPORTANT NEW TRANSPORTATION CORRIDOR OPENS IN PITTSBURGH

by Geoffrey B. Nara, P.E., L.A., Pittsburgh Section

Most people familiar with the major transportation projects in southwestern Pennsylvania immediately think of the Mon/Fayette Expressway when the subject of "important transportation corridors" is raised. But the opening of another critical transportation link for the Pittsburgh area, the West Busway, has the Port Authority of Allegheny County proud.

An undertaking that began over a decade ago, the West Busway opened for service in September 2000. Where once there was an abandoned, overgrown, debris-covered railroad right-of-way, now is a modern rapid transit facility providing numerous community and transit related benefits.

Planning efforts that were the seed of this new facility began 12 years ago with a multi-model corridor study of the Parkway West, Pittsburgh's highway link of its downtown and the airport. This study identified various transportation needs, including transit recommendations. Further studies and refinements led to the Busway proposal. After receiving the Federal Transit Administration Record of Decision in mid-1994, construction started that October. Six years later, the West Busway is a five-mile long, two-lane roadway for buses only, that begins in the Borough of Carnegie and passes through the communities of Rosslyn Farms, East Carnegie, Oakwood, Crafton and Ingram, west of Pittsburgh. It ends in Sheraden near Corliss Street, where it crosses the Norfolk Southern railroad mainline on a flyover, providing an incredible view of the city's Golden Triangle.

The West Busway provides a rapid transit connection between the Airport Corridor to the west, downtown Pittsburgh, Oakland, and other points to the east of the city by way of the East Busway Corridor. It improves mobility within the increasingly congested Parkway West Corridor by allowing buses to bypass Green Tree Hill and the Fort Pitt Tunnels, where traffic delays occur throughout the day, and thereby helps reduce traffic congestion on the Parkway West. Expected time savings are an impressive 25 minutes inbound and seven minutes outbound. Ridership during the first month of operation averaged 6,000 riders per day, with a projected daily ridership of 10,000 by 2005.

The Busway will provide a reliable transportation option during the pending reconstruction of the Fort Pitt Bridge and Tunnels, where the Parkway West connects to the city's central business district. When this bridge and tunnel construction project begins, a major transportation link to downtown Pittsburgh will be disrupted. The West Busway will be a key, viable traffic relief alternative.

Some key features of the West Busway include:

- Total project cost is $326.8 million.
- Alignment follows an abandoned railroad right-of-way which, before the Busway, was overgrown and choked with debris.
- Rehabilitation and enlargement of a 150-year-old railroad tunnel. The 3,000-foot long tunnel was widened from 25 feet to 30 feet, 6 inches using the New Austrian Tunneling Method.
- Renovation and/or reconstruction of 11 existing bridges, including renovating and constructing a new, wider deck on a 70-foot high former railroad bridge.
- Construction of four new bridges, including a 120-foot radius curved girder bridge constructed under the existing Parkway West bridge.
- 55 mph design speed.
- 4,936 linear feet of noise walls.
- 191,000 cubic yards of concrete and 4,200 tons of steel used in construction.
- Interchange with the Parkway West in Carnegie, which provides for direct access for buses from the western suburbs. The interchange was designed to allow for future widening of the Parkway West.
- Access points a several locations that allow buses from feeder routes to use the Busway without the need for transfers.
- Six stations which are fully ADA compliant and patron-friendly, with public telephones as well as information and security phone systems. The stations all have attractive, effective shelters and an aesthetically pleasing, curvilinear design.
- Three on-line park and ride lots providing approximately 460 spaces. Five additional remote park and ride locations throughout western Allegheny County will provide approximately 2,340 new spaces.
- Local police and other emergency personnel are permitted to use the Busway, reducing their response time to emergencies.
- 89 prime contractors and subcontractors, including 38 DBE firms, participated in the construction of the project.

This adds up to an impressive project, fulfilling an important transportation need for the Pittsburgh area. ■

- Miscellaneous repairs to wrought-iron superstructure elements.
- Removal of pack rust, sandblasting and field painting of all new and existing superstructure steel.
- Removal of existing W-beam guardrail from the bridge and replacing it with 2-1/2" I.D. pipe railing connected to the arch verticals with U-bolts. Rail to conform to AASHTO pedestrian rail requirements.
- Refurbishing the existing sandstone block abutments including repointing the mortar joints, capping the blocks with a reinforced concrete seat and backwalls, and constructing a reinforced concrete fill to repair undermining of the forward abutment.

The completed plans were submitted to the Ohio Historical Society. Their comments assured that the historically unique aspects of the structure would be saved for future generations.

With a federal grant from the ISTEA Transportation Enhancement Fund, the Cemetery Road Bridge Restoration was undertaken in 1999 by ODOT, the Mahoning County Engineer and the Village of Poland.

Soda Construction from Niles, Ohio began the restoration in August and completed the project in November.

At a ribbon cutting ceremony on November 18, 1999 ownership of the Cemetery Bridge was transferred from Mahoning County to the Village of Poland. ■

Continued from page 1

held on Saturday, followed by the live entertainment of The Fabulous Hubcaps, recognized as one of the greatest "oldies" bands in the country.

The Seven Springs Resort offers tennis, golf, nature walks and hiking, mountain biking, swimming, horseback riding, alpine slide, beach volleyball and many other resort activities. And of course, the annual ASHE golf outing will be held on the resort's picturesque 18-hole golf course.

For the most up to date conference information visit our website at www.ashe-southwestpa.org. Registration packets will be mailed to all members in April.

The ASHE 2001 National Conference is the perfect place to get away for a long weekend of fun and relaxation. The Southwest Penn Chapter hopes to see you and your family June 7 through June 9! ■

Continued from page 1

- Recognizing exceptional engineering achievements, outstanding math and science teachers and students and a Young Engineer and Engineer of the Year.

Pat has over 34 years of experience in both the public and private sector working in the field of civil/transportation engineering in the Delaware Valley.

Born and raised in West Philadelphia, Pat attended St. Thomas More High School and received his Bachelor of Science degree from Villanova University in 1968, followed by a Master's degree in Transportation Engineering in 1975. He began his career working as a summer co-op for the Pennsylvania Department of Highways. After graduation, he continued working for the state Department of Transportation (PennDOT) in the five-county Southeastern Pennsylvania region.

Pat left government service in 1976 and served in positions of increasing responsibility at several local consulting engineering firms. He is currently the manager of the Highway Design Division of McCormick, Taylor & Associates, a Philadelphia based firm, where he is responsible for numerous projects with a total estimated construction value of over $100 million.

In addition to his notable professional career, Pat is an active member of the American Society of Highway Engineers (ASHE), the American Society of Civil Engineers (ASCE), and the Institute of Transportation Engineers (ITE). He is a George Washington Associate Member of the Engineers Club of Philadelphia.

Pat was appointed to ASHE's Delaware Valley Section Board of Directors in 1981 and became Section President in 1985. He was appointed to ASHE's National Board of Directors in 1990 and served on numerous committees, chairing the Technical Committee and assisting in the development of the National Long-Range Plan for 1995-2000. In 1997, he was elected National President of ASHE. He continues to serve on several Board Committees. He was presented with ASHE's National President's Award for his outstanding and continuing service to the Society at the 2000 National Conference.

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25,742 motorists per day spend less time in traffic.

Fruitville Pike in Lancaster County was a traffic nightmare.

Thanks to the work of consulting engineer firm, Rettew Associates, it's now a highly modernized, efficient and functional gateway connecting Route 30 to northern Lancaster County and the City of Lancaster.

Every day consulting engineers are designing projects that promote a better quality of life and help meet the needs of growing communities.

For more information about consulting engineers or to request our guide to selecting the right consulting engineer, call CEC/PA at 717-540-6811 or visit our website at www.cecpa.org.

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Consulting Engineers Council of Pennsylvania

Engineered for life.

ASHE - Altoona Section Honors National Contest Winners

by Sandy Ivory

The ASHE - Altoona Section recognizes the accomplishments of the following six Mifflin County School District students for their winning bridge building skills at the national Technology Student Association competition in 2000:

Kristin E. Aurand

LEWISTOWN HIGH SCHOOL

Daniella M. Reynolds

LEWISTOWN HIGH SCHOOL

Matthew C. Aurand
Strodes Mills Middle School

Cyle D. Vogt
Strodes Mills Middle School

Britney L. Watt
Lewistown Middle School

Christopher M. McKee
Lewistown Middle School

Advisors
Carl D. Harpster – teacher at Lewistown Middle School
William C. Aurand

We also give special recognition to the members of the Mifflin County School District Board for the financial support that allowed the students to participate in the state and national competitions.

Build Up! A Tool Kit for Learning

EDUCATING TOMORROW'S CONSTRUCTORS TODAY!

What is *Build Up!*?

Build Up! is the first phase of the Construction Futures campaign to expose America's children to the wealth of opportunities offered by a career in construction. The program was developed by the Associated General Contractors of America (AGC), and is now being endorsed by Pennylvania's Highway Construction Workforce Development partners listed below. The educational curriculum aimed at fifth graders is packaged and delivered to teachers in a **Build Up!** Tool Kit.

What is included in the *Build Up!* Tool Kit?

The **Build Up!** Tool Kit is shaped like a tool box which includes activities designed to educate fifth-grade students about the construction industry. These activities emphasize the positive impact on the environment and the importance of construction site safety for children. Each **Build Up!** Tool Kit contains:

- 25-minute video, "How Do They Build Bridges?"
- comprehensive teaching guide
- materials for hands-on activities
- colorful interactive poster, plus family pages that students can share with their parents and strengthen the important learning link between home and school

How to Get Started?

You may sponsor kits at a cost of $185 each. There is no cost to teachers.

1. First check the AGC website at **www.agc.org** to see what teachers and schools have already received the tool kit in Pennsylvania. You will find the Build Up! program under the Education and Training section.

2. Next, contact the local school you wish to send a **Build Up!** Toolkit. More information about contacting schools is also available at the AGC web site.

3. Lastly, fill out the order form on the back with the specific school or schools who agreed to participate.

Once an order has been placed for **Build Up!** Tool Kits, the order will be immediately fulfilled. Approximately two weeks later, teachers will receive a follow-up letter, providing them with the name of the individual/company that sponsored their tool kit.

In addition, supporters will receive a Sponsor Information Kit and notification that the **Build Up!** tool kit has been delivered. The Sponsor Information Kit will include instructions for contacting the teacher, visiting the classroom (if the sponsor wishes) and conducting a hands-on activity that can be led during the visit.

Build Up! A Tool Kit for Learning is endorsed and promoted by:

Associated Pennsylvania Constructors

CEC/PA
Consulting Engineers Council of Pennsylvania

Pennsylvania Turnpike

Federal Highway Administration

Pennsylvania Department of Transportation

Any questions?

Please call Ron Geist, Associated Pennsylvania Constructors, at (717) 238-2513, Chris Drda, PennDOT, at (717) 787-7899, or Karen Smith, PA Turnpike Commission, at (717) 939-9551.

Build Up! Toolkit Order Form

___ **YES,** I/we want to support the AGC **Build Up!** Program by purchasing Tool Kits

I/we will purchase (check one)

___ 3 **Build Up!** Tool Kits at $185.00 each
___ 6 **Build Up!** Tool Kits at $185.00 each
___ 12 **Build Up!** Tool Kits at $185.00 each
___ ( ) **Build Up!** Tool Kits at $185.00 each

___ **YES,** I/we want to support the AGC **Build Up!** Program by contributing $_____ for development costs

SPONSOR INFORMATION: *(Please type or print legibly.)*

Company/Individual Sponsor:_____
Contact: __Mr. __Ms. __Miss _____
(first name) (last name) (suffix)
Street Address: _____
City:_____ State:_____ Zip:_____
Phone: ( )_____ Fax: ( )_____
E-mail: _____

PAYMENT METHOD:

___ Check made payable to AGC Construction Futures or AGC Eduction and Research Foundation Build Up! Fund
___ Credit card payment, provide information below:
___ Invoice me (AGC Chapters and Members)

Credit Card Number: _____ ( ) AmEx ( ) Visa ( ) M/C
Expiration Date (MM/YY): _____Name as Printed on card: _____

PLEASE SEND TOOL KITS TO THE FOLLOWING 5TH GRADE TEACHERS:

Please type or print legibly. Duplicate form as necessary.

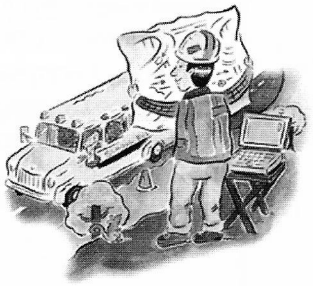
Teacher Name: __Mr. __Ms. __Miss _____
(first name) (last name) (suffix)
Elementary School:_____ Phone:( )_____
Street:_____
City:_____ State: _____ Zip: _____

Teacher Name: __Mr. __Ms. __Miss _____
(first name) (last name) (suffix)
Elementary School:_____ Phone:( )_____
Street:_____
City:_____ State: _____ Zip: _____

Teacher Name: __Mr. __Ms. __Miss _____
(first name) (last name) (suffix)
Elementary School:_____ Phone:( )_____
Street:_____
City:_____ State: _____ Zip: _____

IMPORTANT TAX INFORMATION:

Individual contributions to the Build Up! Campaign are tax-deductible for federal income tax purposes and should be made payable to the AGC Education and Research Foundation Build Up! Fund. Corporate contributions are also welcome, and are considered regular business expenses (not charitable contributions) for federal income tax purposes and should be made payable to AGC Construction Futures. Consult your tax advisor for additional information.



PLEASE RETURN ALL FORMS AND PAYMENT TO:

Associated General Constructors

Attention:
Construction Futures
1957 E Street, NW
Washington, DC 20006

Fax: (202) 347-4004

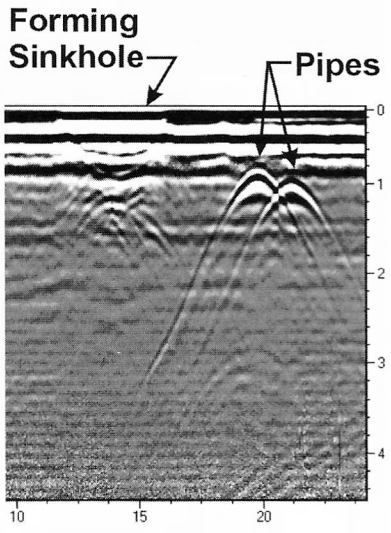
UNDER-UTILIZED RESOURCE
GROUND PENETRATING RADAR (GPR)

Co-Authored by: Steven J. Tidwell and Christopher Proulx

For many project owners, the money invested in subsurface utility investigation is well spent. Designers have documented more efficient designs when the final designs are based on actual site conditions and not on simple reliance on old plans and records. A contractor can no longer afford to guess what lurks beneath the ground where excavation or drilling will take place.

With the advent of new materals like fiber optic, plastic conduits/mains, the challenge to locate and identify utilities has become significantly more complicated. Add to this the ever-shrinking amount of right-of-way and you have the formula for trouble.

Ground Penetrating Radar (GPR) is a safe, non-invasive geophysical method for "looking" underground to locate subsurface features. GPR can detect a variety of metallic, nonmetallic, natural and manmade underground utilities, storage tanks, rebar, sinkholes and voids.



GPR emits a series of high frequency, high amplitude electro-magnetic pulses (radio waves) into the ground from a transmitting antenna into the ground. When the pulses encounter any underground irregularities, a portion of the energy is reflected back to a receiving element at the surface. These reflections are collected as digital images and fed to a portable laptop computer, which then displays a real-time continuous "picture" or profile of a slice of the subsurface area, pinpointing the precise location of the subsurface feature. All substantial features in the subsurface that differ in electrical composition from the surrounding soils will produce a reflection. Subsequently, GPR is capable of locating utilities of all materials.

For greater accuracy, the frequency of the emitted radar wave can be increased. However, greater accuracy and resolution is achieved at the expense of depth of penetration. Generally, as antenna frequency and resolution increases, the maximum depth of investigation decreases. Depth of penetration is also dependent upon the geologic conditions of the soils in which the investigation is being performed. The geology of the soil in which GPR is used governs the performance of any GPR system. The radar waves may be absorbed or scattered depending on the properties of the soil, particularly its electrical conductivity. GPR works best in low conductivity soils and is less effective in highly conductive soils. Generally dry, sandy soils have low conductivities, and wet, clayey, or saline soils are associated with high conductivities.

Because GPR data is immediately available for interpretation and analysis, qualitative decisions regarding a particular site can be made on the spot. Data is displayed on a monitor in real time. Subsurface anomalies are detected, and the operator can usually deduce by its appearance, and other factors, whether it is a pipe or utility, or a natural geologic feature.

In addition, GPR data can be quickly and continuously collected in long survey lines, allowing for greater data collection than other comparable geophysical investigation methods can provide.

GPR is recognized as one of the most powerful remote sensing instruments available today, making it a very effective tool for subsurface locating and mapping investigations. The obvious benefit GPR can bring to your project is the ability to locate buried utilities, including non-metallic and metallic structures. By doing so, GPR can help reduce downtime and the risk of utility hits. In addition, GPR can also be used for a broad range of engineering and environmental applications, including:

- Surface utility engineering (SUE)
- Utility locating and mapping
- Condition assessment of large-diameter utilities/ drainage facilities
- Underground storage tanks and buried drum locating
- Grave site identification and Forensic investigations
- Concrete assessments (rebar spacing, thickness, voids)
- Subsurface void and sinkhole locating
- Examination of structural integrity of roads
- Landfill boundary delineation
- Bedrock surface profiling
- Groundwater table mapping
- Conductive contaminant plume mapping
- Shallow bedrock fracture and fault mapping
- Archaeological investigations

The tasks of skillfully operating GPR equipment and interpreting the resulting data require in-depth geophysical training and field experience. In addition, it is necessary for the GPR consultant to have a working knowledge of the geology of the targeted subsurface area to fully understand and interpret the results and limitations of a GPR survey at that location.

Continued on page 20

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Despite the obvious advantages of GPR, it is not entirely foolproof. It is an art as well as a science. Due to the ease and speed of GPR data collection one may assume that being able to utilize the resulting data for practical purposes is equally as fast and easy. However, due to the ambiguities and intricacies associated with GPR data, as well as the parameters that affect data acquisition, this is not the case. The key to using GPR to its fullest potential is high quality data interpretation, which is the product of a well-designed GPR investigation performed by an experienced geologist or geophysicist.

The future use of GPR depends upon an awareness of its abilities and limitations. At the moment, GPR is being used extensively by the engineering and construction industry to map utilities and plan accordingly. The successful usage of GPR for subsurface utility identification will be the result of the use of other new technologies in combination, such as vacuum excavation, and electromagnetic pipe locators. GPR does not identify the specific subsurface/utility type; hence, verification is necessary using other methods. Non-destructive air-vacuum excavation is used to determine the exact horizontal and vertical location of utilities. The process involves removing the surface material over approximately a 1'x 1' area at the determined horizontal location. The air-vacuum process then proceeds with the simultaneous action of compressed air-jets to loosen soil and the vacuum extraction of the resulting debris. The process continues until the utility is uncovered and physically verified.

Incorporating both technologies makes good engineering and design sense for any type of design or construction project – building airports, utilities, transit, or any other public works construction – requiring excavation around existing underground utilities or features.

These activities provide "quality levels" of information or degrees of risk. The higher the level of information, the less risk involved in accurately plotting the underground facility's location. The highest level is only obtained when visual conformation has occurred. ■

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MAIL ARTICLES TO: ASHE SCANNER
c/o Robert M. Peda, P.E.
908 North Second Street, Harrisburg, PA 17102
Copies on disk in MS Word Format are preferred

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13% are Related Professions
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For Special Ads, please call Editor

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