Merco:
Providing Specialty Solutions

Contract Termination Clauses

TBM Tunneling for New York’s East Side Access

Slurry Tunneling in the United States

tunnelingonline.com
Hard Rock Power in the USA.

The Combined Sewer Overflow System (CSO) in Atlanta (Georgia, USA) reaches peak capacity during heavy rains. About 80 times per year combined sewage runs into the Chattahoochee River. The West and East Area CSO Tunnel will collect, store and transport 670 million liters of flooding water to a new treatment plant. The pipe with a total length of 13.4km and 7.92m diameter is bored and secured in gneiss and granite by two Herrenknecht Gripper-TBM's (each Ø 8.23m), equipped with 19" Herrenknecht Cutter Tools. At the end of July 2005, the Gripper-TBM S-288 started tackling the 6.8km long tunnel section and achieved best weekly performances of 156.4m and 1,748m of completed tunnel in the meantime. Since mid-August 2005, the second machine S-289 of the same type has already driven 2,110m, reaching best weekly performances of up to 208.5m. The giant storage tunnel is scheduled for completion by the end of 2007.

Herrenknecht. With Teamwork Tunnelling to breakthrough.

Contractor: Obayashi Massana JV
Machine data:
S-288, S-289
2 x Gripper-TBM, Ø 8.230mm,
Cutterhead power: 3,150kW
Tunnel length:
S-288: 6,800m
S-289: 6,600m
Geology: gneiss, granite
Up here...

no one really notices.

Our engineers advocate trenchless technology solutions — the most environmentally sensitive form of underground construction.

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Cover Story

**Merco: Providing Specialty Solutions**

Merco Inc., based in Lebanon, N.J., has carved a niche for itself as a contractor by tackling the jobs that other people can’t or won’t do – including tricky bridge and tunnel rehab jobs.

*By James W. Rush*

Features

**TBM Tunneling for New York’s East Side Access**

Work is under way on this ambitious transportation program in New York City that will bring Long Island Rail Road trains in Grand Central Terminal.

*By Desiree Willis*

**Developing America’s Energy Future**

Roadheaders play an important part in developing infrastructure to access some of the nation’s oil shale reserves in Colorado.

**Slurry Tunneling in the United States**

With the success of the slurry tunneling method on the Portland West Side CSO project, could the time be right for further use in the United States?

*By James W. Rush*

**Contract Termination Clauses**

Part I of a two-part series, this article takes a closer look at the “termination for fault” clause.

*By Peter Kutil and Karl Silverberg*

**North American Tunnel Project Update**

A rundown of the latest activities at major tunneling projects around the United States and Canada.

*By Jack Burke*

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In cooperation with
Trenchless Technology
Tunnel Business
Innovation and the Underground

In the October issue of Tunnel Business Magazine, we typically profile some of the leading contractors serving the North American market. This year, we profile Merco Inc., led by Steve and Mike Mergentime. Steve and Mike have done an excellent job of following in the footsteps of their father, Charlie Mergentime, who is well known within the industry as a pioneer, in keeping his innovative spirit going following his death in 2004.

Merco typically keeps a low profile; the company is found doing the small to medium size works that other contractors can’t or won’t do. Many of the projects they complete involve some special needs that call for their experience, hard work and a knack for coming up with new ways of attacking a problem. Merco has a history that spans the heavy construction market, from underpinning, foundations, bridge and tunnel works. Recently, they have successfully tackled tricky rehab jobs that require “out of the box” thinking that draws upon their broad base of experience. The full story begins on page 16.

Also in this issue, we profile the TBM work that is beginning as part of the East Side Access project in New York. The East Side Access project will bring Long Island Rail Road into the Grand Central Terminal, and is one of many major transportation upgrades being planned for the city. The $6.3 billion project involves TBM tunneling from the 63rd Street Tunnel into Grand Central Terminal, and chamber excavation at the terminal to house addition platforms. For more details, see the full article beginning on page 20.

Also being planned or under construction are the Second Avenue Subway, No. 7 line extension and the Trans Hudson Express. These and other major tunnel programs being planned across the country reinforce the need to attract new workers and engineers into the industry. This is a problem that is being addressed at various levels by many groups and companies. At the recent Rapid Excavation and Tunneling Conference, scholarships were awarded to engineering students to garner their interest before they enter other fields. Shannon and Wilson’s Red Robinson, who serves on the executive committee for RETC, reports that interest in the RETC scholarship program is on the rise. When the program was started, there were more scholarships available than there were applicants. This year, applicants exceeded openings for the first time. This is a small step toward meeting the need for qualified young engineers in the industry, but it is a step in the right direction. For more details, see the My Turn article on page 42.

Regards,

James W. Rush
Editor
Experience.


The numbers say it all. 50 years, 3500 km of tunnel, 700 projects completed worldwide. In fact, Robbins machines have bored more tunnel, and our cutters have excavated more hard rock, than any of our competitors.

It is not just the quantity, but the quality of Robbins’ experience that sets us apart. We’ve been the supplier of choice for some of the most demanding projects in history. The greatest geological problems and environmental challenges.

The longest tunnels. The most remote locations in the world. If it can be imagined, Robbins has the experience to make it a reality. Learn more.

Putzmeister America Acquires Allentown Equipment

Effective July 2, 2007, Putzmeister America Inc., officially acquired Allentown Equipment of Pennsylvania, making it a wholly owned subsidiary within the global Putzmeister Group. With over 95 years in business, Allentown is the industry leader in the design and manufacture of wet and dry process shotcrete equipment for underground, refractory, repair and new construction industries. To reflect the new affiliation, the company name was changed to Allentown Shotcrete Technology Inc., a subsidiary of Putzmeister America Inc.

As a result of the acquisition, the two global organizations will bring together over 50 complementary products to provide the most comprehensive range of sprayed concrete equipment for large and small applications. From their Allentown, PA., location, Allentown Shotcrete Technology will continue production of their reputable range of pressure tank guns, rotor guns, rotary bowl guns, wet process pumps and high pressure pumps. Plus, due to their shotcreting expertise, Allentown will become the focal point in handling major North American underground construction projects for the worldwide Putzmeister organization.

Dave Adams, president and CEO of Putzmeister America Inc., will now also assume the role as CEO of Allentown Shotcrete Technology Inc. Patrick Bridger, recently promoted as president of Allentown, will continue in this key position, and report to Adams.

“The acquisition greatly expands our product line to offer customers the widest range of trailer-mounted gunite and shotcrete models produced in America, to the highly extensive line of track- and truck-mounted robotic equipment from the Putzmeister Underground Construction division in Germany,” said Adams. “Allentown also brings a quality reputation, leading market position and knowledgeable personnel to the Putzmeister team.”

“In addition, we anticipate mutually beneficial growth opportunities,” noted Adams. “Allentown will fully utilize Putzmeister’s worldwide technical, sales and marketing resources to promote the company’s shotcrete products on a more global basis. Concurrently, Putzmeister will benefit from Allentown’s dominance in the underground and refractory markets to increase the level of Putzmeister product exposure in these specialized fields.”

“We’re excited about joining the Putzmeister Group. Although our business operations will remain virtually unchanged in Allentown, we’re anxious to begin our added role as the U.S. outlet for overseeing highly technical shotcreting projects in North America, and distributing applicable worldwide Putzmeister products here,” said Bridger. “This will result in the customer receiving the best equipment choice for their specific job needs — from tunneling and mining to refractory and repair work.”

“We clearly saw the strategy of the acquisition and felt it was a sound investment,” said Vicki Fox, managing director of Emory & Co. in Milwaukee, Wisconsin – the investment banking firm advising Putzmeister during negotiations. Terms of the transaction were not disclosed.

A ceremonially event was held at the Racine Marriott in Wisconsin, whereby the contract was signed among 20 people in attendance. To welcome Allentown personnel to the Putzmeister team, Dave Adams presented gold Putzmeister pins to Patrick Bridger; Allentown president and George Yoggy, 40-year shotcrete industry veteran of Allentown.

A symbolic celebratory champagne toast recognized the successful completion of the acquisition and those instrumental in its process. In particular, this included Adams, Bridger and Yoggy along with Felix Selinger of Putzmeister AG and Vicki Fox of Emory & Co.

As a gesture of the newly formed business relationship, George Yoggy also presented the book “From Elephants to Swimming Pools”, which describes the history of shotcreting within the United States. The book specifically credits the 96-year-old Allentown organization as an integral part of the market’s successful development, noting their invention of the “cement gun” and the importance of their registered trademark, “Gunite”. The book’s author had signed a personal message in copies for Dave Adams and Putzmeister owner, Kari Schlecht.

The momentous occasion concluded with the special unveiling of the new Allentown logo, which will be incorporated in all future promotions.
Route Chosen for Indianapolis’ Belmont-Southport Interplant Connection Project

City engineers have chosen a route for the design of a 6.5-mile-long underground sewer linking Indianapolis’ two wastewater treatment plants. The Interplant Connect is a key component of the city’s long-term, $1.8 billion plan to reduce raw sewage overflows to the White River and other neighborhood streams.

Design of the Interplant Connect will be completed in 2008 with construction expected to begin in summer 2008. Under the city’s agreement with state and federal regulators, the project must be fully operational by Dec. 31, 2012.

When complete, the 12-ft diameter Interplant Connect will enable the city to better manage flows between the Belmont and Southport advanced wastewater treatment plants.

“Currently two-thirds of our flow goes to Belmont and one-third goes to Southport,” said John Morgan, engineering project manager for the Department of Public Works. “With the interplant connection we will have more flexibility to deliver a higher volume of flow to Southport, especially during wet weather when Belmont is overloaded.”

Up to 320 million gallons of wastewater could flow through the new sewer each day, with the highest volumes during and after wet weather.

The Interplant Connect first will be used to manage flows between the plants and prevent sewer overflows into the White River near Southern Avenue. After the city finishes construction of the Fall Creek-White River Deep Tunnel in 2025, the Interplant Connect will convey up to 150 million gallons per day from the deep tunnel to the Southport treatment plant following wet weather.

**PROJECT AT A GLANCE**

**Project Location:** Indianapolis, Ind.

**Owner:** City of Indianapolis, Department of Public Works

**Project Description:** Approximately 35,000 lf of sewer pipeline with multiple access and connection structures and a 75 mgd pump station. Approximately 29,000 lf will be 144-in. ID and will be constructed by tunneling. Approximately 6,000 lf will be 120-in. ID and is anticipated to be constructed by open-cut methods.

**Tunnel Depth of Cover:** Typically 20 to 60 ft of cover above the tunnel crown.

**Typical Ground Conditions:** Outwash sands and gravels, with occasional strata of cohesive till. Groundwater elevations range from at the crown to up to about 20 ft above the crown.

**Tunnel Method:** Pressurized face TBM.

**Anticipated Tunnel Lining:** Single-pass bolted and gasketed precast concrete segment lining.

**Prime Consultant/Project Manager:** Earth Tech Inc.

**Geotechnical/Tunneling Consultant:** PB Americas Inc.

**Design Completion Date:** April 2008

**Bidding Period:** May-June 2008

**Construction Completion Date:** Dec. 2012

**Project Contact:** Steve Nielsen, Project Manager, Earth Tech (317) 712-2903

Steve.nielsen@earthtech.com

Web: www.indycleanstreams.org
Three Killed in Accident at Indiana Mine Site — Frontier Constructors Co-Founder Dan McFadden Among Dead

Three people, including Frontier Constructors co-founder Dan McFadden, were killed Aug. 10 after a sinking bucket suddenly tilted, causing them to fall down a 530 foot deep mine shaft. The other men were Mining Group Manager Christopher T. Richardson, 38, of Cedar Bluff, Va., and Project Engineer Jarred A. Ashmore, 23, of Henderson, Ky. Both worked for Evansville, Ind.-based Frontier-Kemper Constructors, Inc., which was contracted by Gibson County Coal LLC to construct the shaft. The work was nearly completed.

McFadden, 66, founded Frontier Constructors with Dyke Howell in 1965. After a series of joint ventures, the company merged with Kemper Construction in 1977 to become Frontier-Kemper. McFadden retired in 1995 and was living in Greybull, Wyo. Howell retired the same year and now lives in Florida. They were in Indiana as part of the company’s celebration of the 100th year anniversary of the founding of Kemper Construction, the 45th anniversary of the founding of Frontier-Constructors and the 32nd anniversary of the merger. McFadden was born in Mount Vernon, Ind., graduating in 1963 with an Engineer of Mines degree from Colorado School of Mines. Dyke Howell graduated the same year and two years later they started Frontier Constructors in Evergreen, Colo. The company focused on mine shafts, slopes and related work, complementing Kemper Construction’s civil construction base. The company established its headquarters and yard in Indiana in 1975 to better serve the Midwestern and Appalachian coalfields.

Frontier-Kemper’s Bob Pond, also a classmate of Dan and Dyke, told TBM that “In the nearly 30 years we worked closely together, I was lucky to know Dan on many levels: close friend, hunting partner, ‘runnin’ buddy’ and employer. Dan was passionate about everything he did and cared about, most of all his family and Frontier-Kemper. He understood that any fool with a checkbook can buy equipment, but surrounding yourself with the best and most loyal people you can find is the real key. Most of all, he was the real deal ... scratch Dan, you got more Dan. Most members of today’s Frontier-Kemper family never had the honor of working with Dan, but his legacy — hard work, best people, intelligent risk-taking — lives on.”

Ashmore and Richardson were up-and-comers within the Frontier-Kemper community. Ashmore was from a Kentucky coal mining family and earned a civil engineering degree from the University of Evansville. Richardson, a Southwest Virginia native, had in 15 years bootstrapped his way up from miner; recently being promoted to Mine Construction Group Manager in charge of all FKCI’s coal work.

“The death of Jarred and Todd is not only a tragic and incurable loss to their families, but also to their extended family at Frontier-Kemper. All we can do is honor their lives and their legacies by following the lamps they lit to make FKCI a great place to work and a great company,” Pond said.

Baystate Environmental Consultants Joins GZA GeoEnvironmental

GZA GeoEnvironmental Inc., a leading environmental and geotechnical consulting firm in the Northeast, has announced that Baystate Environmental Consultants Inc. (BEC) of East Longmeadow, Mass., and East Hartford, Conn., has joined the company and expanded GZA’s capabilities in Massachusetts and Connecticut.

BEC will operate as a wholly owned subsidiary of GZA. BEC has been providing civil engineering, environmental permitting and water resource expertise in the Northeast for over 35 years. Whether it’s performing environmental impact studies for major construction projects, working with public and private water supply systems or designing commercial and residential development projects, BEC’s civil engineers and environmental scientists work hand-in-hand to guide their clients through the environmental permitting and design process. The firm’s clients include architects, engineers and planners; federal and state government agencies; municipalities; and private developers.

BEC will continue to operate from its East Longmeadow, Mass., location. The East Hartford, Conn., office will merge into GZAs newly expanded office in Bloomfield later this year. GZA consolidated its Hartford area operations in Bloomfield, Conn., last September, combining staff from its long-term Vernon location with the staff from Environmental Risk Limited (ERL), which joined GZA in 2006. The addition of BEC will allow GZA to offer expanded professional services and technical capabilities, creating one of the most experienced and versatile consulting firms in the Connecticut River Valley.

“BEC is a well respected name in the industry with a strong culture of providing individualized service for all of their clients,” said William R. Beloff, President and CEO of GZA GeoEnvironmental, Inc. “They share our commitment to bringing efficient solutions for all of their client’s individual needs. Their knowledge and expertise will further enhance our continued commitment to the highest level of services for all of our existing and new clients.”

Founded in 1964, GZA GeoEnvironmental, Inc. is a multi-disciplined firm providing environmental consulting, geotechnical and civil engineering, environmental remediation contracting, regulatory compliance, litigation support, air quality, solid waste services, specialty construction, occupational health and safety, and site development services.

Manitowoc Acquires Shirke Tower Crane Business

The Manitowoc Co. Inc. has acquired Shirke Construction Equipments Pvt. Ltd. Shirke is headquartered in Pune, India, and manufactures Potain tower cranes under license. It is also the Potain distributor for India, Sri Lanka, Nepal, Bangladesh, and Bhutan.

The newly acquired business will operate in the future as Potain India Pvt. Ltd. and will continue to manufacture tower cranes under the Potain name.
Eric Etchart, president of Manitowoc Crane Group, said the Shirke acquisition was an excellent fit for the company.

“The Shirke acquisition fits with MCG’s policy of providing industry leading customer service through strong local representation,” he said. “Customers in India and the surrounding region will benefit from our investment. In addition, Potain’s resources and capability in the global tower crane market will be further strengthened.”

The acquisition gives Manitowoc Crane Group a strong presence in the fast-growing Indian market. The company has also announced plans for a new Manitowoc Crane CARE facility to ensure its customers in the region receive the very highest levels of service.

T. R. Badarinarayan, chief executive officer of Shirke Construction Equipments Pvt. Ltd., said the timing of the MCG acquisition was perfect.

“We have been selling tower cranes in India for well over 30 years and know the market better than anyone,” he said. “The economic growth over the past few years represents the start of a new era in India’s construction history. Our incorporation into the Manitowoc Crane Group will allow us to continue to serve the market from a position of strength.”

Shirke has been in the construction industry since the 1940’s. Since the 1970’s it has focused on tower cranes. The employees and management of Shirke will continue in their current roles.

Etchart said the Shirke acquisition strengthens MCG as a global entity. “This acquisition is a strategic move on our part that extends our manufacturing capacity and our global footprint,” he said. “It demonstrates that we are focused on maintaining and developing our position as a leader of the lifting industry, delivering maximum value to our customers.”

In other news, Manitowoc announced that it has broken ground on a $7.4-million addition to its Port Washington, Wis., facility in the United States.

The 23,000-sq ft addition will house a new machining center as well as a 4,000-sq ft painting area. With this new addition, the Port Washington facility will be responsible for building the entire lower works of Manitowoc’s Model 16000, among other models.

Central to the new addition is the installation of a new boring bar, which is a large metal cutting tool. The boring bar at the Port Washington facility will machine crawler side frames and carboys.

Physical construction of the expansion began in early August and will be complete by January 2008. Installation of the boring bar will complete the project in June 2008. There are currently 106 employees at the Port Washington fabrication facility; the new addition will create 25 more jobs at the facility.

Larry Weyers, executive vice president for the Americas region, says the facility addition is yet another example of...
how Manitowoc Crane Group is responding to customers. “This new machining center at the Port Washington facility means that Manitowoc Crane Group can add capacity and more advanced capability to our US-based manufacturing operations,” he says. “This not only helps the local economy in terms of job creation, but continues the tradition of the Manitowoc Crane Group being a manufacturing leader in all of the regions that it serves throughout the world.”

ISUFT Call for Papers
The 5th International Symposium on Underground Freight Transportation by Capsule Pipelines and Other Tube/Tunnel Systems (ISUFT) 2008 (www.isuft.com) will be held March 20-22, 2008, at the University of Texas at Arlington campus, and organized by Center for Underground Infrastructure Research and Education (CUIRE).

Interested persons are invited to submit an abstract covering relevant topics, including:

- Pipeline transport
- Underground freight transport systems
- Underground construction technology
- Modern tunneling technologies
- Design of capsules and vehicles used in underground freight transport
- Cost and economics of underground freight transport systems
- Legal and environmental aspects of underground freight transport
- Geology and Geotechnical Issues

For more information, visit www.isuft.com, or contact Behnam Hashemi, Research Assistant, Center for Underground Infrastructure Research & Education (CUIRE), at (817) 272-5695 or shashemi@uta.edu.

Miller to Lead MEYCO Sales and Service
The Admixture Systems business of BASF, along with MEYCO Equipment, a division of BASF Construction Chemicals, now offers full sales and service support for the complete line of MEYCO sprayed concrete equipment within the NAFTA underground construction market.

To lead this initiative, BASF has appointed Mr. Gregory J. Miller as Equipment Sales Specialist. In this role he will facilitate equipment sales and service and manage the spare and wear parts business. He will also play a key role representing the BASF Underground Construction (UGC) Group in the NAFTA region in equipment-related projects and development projects, working closely with the MEYCO sales and engineering staff in Switzerland.

Miller comes to BASF with 21 years of equipment sales, service and manufacturing experience, with nine of those years specializing in shotcrete equipment and application. “With the combination of our worldwide resources for underground, the domestic availability of MEYCO equipment and the experience and dedication of Greg Miller, the Underground Construction Group is poised and ready to meet the growing demands of our customers,” stated Chris Gause, Area Manager for the UGC NAFTA group of BASF.

A Swiss based company, MEYCO has been the market leader in shotcrete equipment for nearly five decades. The company’s product portfolio includes wet-spraying and dry-spraying machines, manipulators and complete mobile units to offer customized solutions to the underground construction market.

Palermo Elected to UCA Executive Committee
Robert J. Palermo, P.E. of GZA GeoEnvironmental, Inc. has been elected to the executive committee of the Underground Construction Association of the Society for Mining, Metallurgy and Exploration.

Palermo joined GZA in 1978 and is currently a Senior Principal. He has been involved in underground design and construction for 34 years. He is a licensed engineer in 13 states and has extensive experience in all aspects of geotechnical engineering and underground construction. His experience includes all aspects of complex projects involving geotechnical engineering and underground construction, including tunneling in soil and rock, cavern design, lateral support systems, risk assessment, geotechnical instrumentation, seismic design, underpinning, construction dewatering and blasting.

Palermo served as the Chief Geotechnical Engineer during the preliminary design of the $17B Second Avenue Subway and is currently involved with work for the contractor on No. 7 Line extension, both in New York City. He has also worked on major underground transportation projects in Baltimore, Seattle, Miami and Boston. Palermo is an active member of the Underground Construction Association of the Society for Mining, Metallurgy and Exploration and was chairman of their George A. Fox conference on underground construction for the past two years. He is currently serving as a committee member for that conference as well as serving on the North America Tunneling Conference 2008 organizing committee. He is also a member of the Moles.

“We congratulate Bob on being elected to this important industry leadership position,” said William R. Beloff, President and CEO of GZA. “His extensive expertise and experience have been invaluable to our many clients and we trust that his strong leadership skills bring great value to the Underground Construction Association.”
A 9.7 m (31.8 ft) TBM will be the first Robbins machine to bore on one of Europe’s largest tunneling projects in recent memory. The contract was signed with the Consorzio Monte Ceneri (CMC) JV—a consortium of CSC, Lugano, Frutiger SA, Thun, Rothpletz, Lienhard + Cie, and Aarau—for a 2.4 km (1.5 mi) long adit tunnel on the Ceneri Base Tunnel Project in Switzerland. The new tunnel is part of the much larger AlpTransit Project and will connect with the 57 km (35 mi) long Gotthard Base Tunnel.

The Main Beam TBM will be completely refurbished near Milan, Italy and the cutterhead diameter will be changed from 7.6 m (24.9 ft) to 9.7 m (31.8 ft). The cutterhead will be the first on the AlpTransit Project to utilize larger diameter 19 inch cutters. The TBM previously bored successfully on the main headrace tunnel of the Kárahnjúkar Hydropower Project in Iceland.

Located in Switzerland’s Canton Ticino region, the Ceneri Base Tunnel Project will involve construction of twin 15.4 km (9.5 mi) long main rail tunnels running in North and South directions for owners AlpTransit. The tunnels are part of AlpTransit’s massive project to provide more efficient rail freight routes via base tunnels through the Gotthard and Ceneri mountain ranges. Currently, freight trains traveling up the mountain ranges require pushing locomotives due to steep gradients. The base tunnels will provide a route for freight trains with minimum elevation gain and will shorten passenger train times between Zurich and Milan. Some route times, such as the trip between Lugano and Bellinzona, will be cut in half with the completion of the Ceneri tunnel.

The adit tunnel in Sigirino, to be bored by the Robbins TBM, will join up at approximately the halfway point of the main rail tunnels. Rock in the area consists of schist, Swiss molasse, and Ceneri orthogneiss with a UCS of 30 to 130 MPa (4,300 to 18,800 psi). The geology is expected to be good for TBM boring, with no squeezing ground or large water inflows anticipated. New probe drills, being designed in Robbins U.S. locations, will be used to verify ground conditions ahead of the TBM. Temporary tunnel support including rock bolts, ring beams and shotcrete will be used depending on geology. Excavated material will be temporarily stored at a lot onsite for later preparation as rock aggregate for concrete.

The TBM will bore through geology similar to that found in the Gotthard Base Tunnel, which used 17-inch back-loading disc cutters. Larger diameter 19-inch back-loading disc cutters, first pioneered at the Kárahnjúkar Hydropower Project, offer a higher cutter load and longer cutter life than the 17-inch design, resulting in fewer cutter changes.

Adit tunneling using the Robbins TBM is scheduled to begin in Autumn 2008 and will take about two years to complete.
The View from the Hole

Boosting Enrollment at Engineering Schools

by Bob Pond

We would all agree that we are falling behind in creating newly minted engineers fascinated enough by the work to be wet, cold and dirty, wed, “and still have time for romance.”

SOB’s got a solution...

Some years ago, law school enrollment by women and minorities followed the rising popularity of the TV show “L.A. Law.” The Wall Street Journal reported that a Congressional Task Force was seeking ways to attract more women and minorities to engineering and science. “These people do important, dramatic things,” team leader Susan Coady Kemnitzer said, “and still have time for romance.”

Pointing to the spike in law school enrollment that coincided with the show, Kemnitzer said that a television engineering melodrama could “do wonders for undergraduate interest in the field.”

Today we know that the idea never really took hold, but it was probably because Kemnitzer didn’t have a top-notch screenwriter on her staff. Imagine what might have been at the top of the charts if she had. Here are a few samples to whet your appetite.

Bridge

[Open with a subdued Whitney Houston melody]

A couple of yuppies want to get to the other side of the river without getting the tires of their Beammers wet. They look through Forbes, GEO and GQ without finding any self-help articles on the subject. They look in the Yellow Pages and choose a civil engineer so that they will not offend anyone’s sensibilities.

The civil engineer designs the bridge with a modified Patten truss, superimposing it on a corbelled arch, but the yuppies consider it too Spartan and order a bridge from the Sharper Image, scheduling an erection party after the next Bronco game.

Due to a warehouse mistake, the bridge is too short. The yuppies eat crow and ask the civil engineer to fix it. The engineer dredges the river to narrow the channel and the bridge fits.

[Close with a passage from “Also Sprake Zarathustra”]

Sewer

[Open with the theme from “All in the Family”]

A Neighborhood Watch group notices that a home occupied by some college students is grossly malodorous. Gaining entry by the ruse of a Tupperware party, the group finds that the toilets are badly backed up but that the students didn’t notice because they cook at home a lot.

The group makes placards and demonstrates on the steps of City Hall, making the Mayor late for his massage, so Congress appropriates $21,000,000 for a new sewer for the neighborhood.

The EPA looks in the Yellow Pages and hires a hydraulics engineer to design the new sewer. She checks the elevations of all the houses and of the main sewer, figures out what size the sewer pipes have to be and where they should go, drawing it all up on a big display. The City hires a contractor who digs up the neighborhood, puts in the sewer pipes and fills in the holes.

The students can now smell what their food is really like and have plastic surgery to look more like prison inmates, who have better food.

[Close with the theme from “Around the World in 80 Days”]

Office Tower

[Open with the theme from “Wall Street”]

An investment bank outgrows its headquarters and decides that it needs to build an office tower downtown to expand, and hires a construction manager to make the arrangements.

The construction manager has her staff look in the Yellow Pages and hire a structural engineer to design the framework for the building, an architect to design the exterior, and an interior decorator to make sure it looks like a bank inside.

The architect and the interior decorator have artistic differences so the structural engineer settles the matter by explaining that the structure cannot accommodate either of their designs.

[Close with “Solomon’s Song”]

Courtroom

(Possible joint mini-series with LA Law and Hill Street Blues)

[Open with “Dueling Banjos”]

The Highway Department is suing a Contractor over faulty workmanship that led the new highway to collapse when a circus caravan traveled over it for the first time. The stakes are high...
because the ensuing collisions caused the elephants to suffer from whiplash.

The lawyer for the Highway Department (Victor Sifuentes) looks in the Yellow Pages and hires a concrete engineer, who goes to court and testifies that the concrete was not poured properly.

The lawyer for the Contractor (Joyce Davenport) looks in the Yellow Pages and hires a concrete engineer, who goes to court and testifies that the concrete was poured properly.

The Highway Department’s concrete engineer is so persuaded by the testimony of the Contractor’s engineer that he secretly tells Sifuentes that the Contractor is right and they should settle out of court.

The Contractor’s concrete engineer is so persuaded by the testimony of the Highway Department’s engineer that she secretly tells Davenport that the Highway Department is right and they should settle out of court.

Sifuentes and Davenport meet over drinks to negotiate a settlement and fall in love, rent a hotel room, make love all night and are late for court.

The two engineers meet for coffee and decide to form a consulting engineering firm.

The circus goes out of business.

[Close with “Lara’s Theme”]

Seminar

[Open with “When You Wish Upon a Star”]

Three just-graduated engineering school classmates work at the same consulting firm on the 24th floor and have had a problem with ink leaking past their plastic pocket protectors, ruining their shirts and blouses. The firm newsletter announces a Seminar on proper engineering attire so they sign up expecting to learn how to avoid this problem in the future.

They discover that sudden changes in atmospheric pressure in their morning elevator ride are changing the internal dynamics of the fluid reservoirs in their pens, so after the Seminar they ask to be moved to a lower elevation.

The firm, always eager to accommodate the needs of its employees, transfers them to the tunneling department and issues them chalk instead of pens. They do not get ink on their shirts and blouses again.

[Close with “Way Down in the Mine”]

Please send all royalty checks to:

Sweet Old Bob
Palatial Mountain Retreat
Shortstump, Indiana 47799

Sweet Old Bob

Bob Pond is vice president of Frontier Kemper Constructors Inc., Evansville, Ind.
Constructing underground facilities can be complex and challenging work. Urban environments have existing utilities, buildings, street traffic and residents and businesses that must be contended with – not to mention Mother Nature herself.

But rehab projects can be equally challenging. Maintaining the service that the infrastructure was built to provide while simultaneously upgrading it poses unique design and construction challenges that call for innovation and experience.

Merco Inc., headquartered in Lebanon, N.J., is a contractor with a long history of infrastructure construction and rehabilitation that uses its expertise to develop tailored approaches to solving complex problems that is unique in the industry.

Merco, established in 1991 by Charlie Mergentime and sons Steve and Michael, builds on the reputation of innovation forged by its company founder, who passed away in 2004.

Charlie Mergentime was an industry pioneer who played a prominent role in the construction of subway systems in Washington, D.C., Atlanta, Boston,
Philadelphia and Pittsburgh. In fact, he was recognized as introducing the New Austrian Tunneling Method (NATM) to North America as part of Washington Metro construction. Another first was the introduction of horizontally jacked spiling to bore under an active railroad for the Atlanta subway, allowing the rail service to remain active.

He was honored by The Moles in 1987 for Outstanding Achievement in Construction and by ASCE in 2004 with the Outstanding Projects and Leaders (OPAL) award for lifetime contributions in construction.

“Mergentime was one of the most noteworthy visionaries in construction,” said Patricia Galloway, president of ASCE at the time of the OPAL award. “He was widely recognized as an industry leader for developing new construction methods.”

Carrying on the Tradition

The spirit of innovation that Mergentime developed was passed on to Steve and Michael and is evident in Merco today. Ask the Mergetimes to tell you about a unique project, and there is no shortage of examples. From railroad projects to bridges to heavy civil, the company has built a niche for itself in doing the jobs no one else can do or is willing to do.

“We started as a specialty contractor performing foundation work and underpinning, and eventually developed into a general contractor,” Michael said. “Now we perform a wide spectrum of work that is not run-of-the-mill. Just about every job we do has some facet that is unique.”

“One thing our father stressed was innovation. He was always looking at ways to innovate, ways to give us an edge. Sometimes it worked, sometimes it didn’t, but the idea of looking for a better way to do something has been the basis of the business and it has served us well. Other companies may have more resources, but oftentimes you can compete by finding new ways of going about business.”

The spirit of innovation is suited particularly well to rehabilitation jobs. “We like to do the specialty jobs where we can take advantage of our expertise,” Steve said. “We are able to draw upon our history, which includes tunnels and underground work, bridges and marine construction. We have a range of experience regarding construction methods, including NATM, Drill and Blast, road headers and Shotcrete, Support of excavation systems and rehabilitation projects. We also have great people, who will go the extra mile to get the job done.”

Both Steve and Michael grew up in the construction industry, working in the equipment yards and as laborers, and piledrivers on projects. That experience coupled with the civil engineering studies at Purdue University, and military service has given the brothers a unique vantage point on the industry. “It gives you a different perspective on how to do things,” Steve said. “The main thing you learn is that there is no silver bullet; hard work is the key to success.”

Steve says that staying on top of and expanding current practice is part of the long-range planning at Merco. “Every few years we have found it necessary to expand our toolbox,” Steve said. “We routinely do our own pile driving, drilling and blasting, concrete, design … there are a lot of different services we offer and we have experience doing them.”

Innovation is not limited to construction techniques. The company also prides itself on its equipment modifications and enhancements – either in-house or with equipment manufacturers.

Work Experience

There are several representative projects that showcase Merco’s skill set, including
bridges and marine work. Below are some of the more high-profile jobs that the company has completed over the last few years.

Cameron Run Tunnel, Alexandria, Va.: This project involved the rehabilitation of seven 20-ft diameter tunnels, 200 ft in length that serve as storm channels underneath a railroad. Merco was contracted to rehab the corrugated iron tunnels, which were 20 years old at the time and were being deformed above the spring line.

Previous rehab methods had failed, leaving temporary wooden supports inside the tunnel as the primary method of support. Merco developed a rehab scheme that involved expanding the existing support back out into ovate shape and inserting steel supports. Once the steel supports were set, Merco used shotcrete to reline the tubes.

The railway above the tunnels needed to remain active at all times. A strict monitoring program was implemented to ensure that the lines were unaffected by the construction.

“That project involved jacking a failed liner back into place under active railroad lines,” Michael said. “That was something that had never been done before.”

Bergen Tunnel, Jersey City, N.J.: The Bergen Tunnel rehab project involved the reconstruction of twin tunnels, 4,400 ft long, completed in 1877 and 1908, respectively. In a joint venture with Obayashi, Merco worked to waterproof and enlarge the tunnels, as well as install safety upgrades. The project involved an aggressive schedule, working three shifts a day for five days a week. To complicate matters, there were restrictions on blasting, and all the while train traffic had to be maintained in the adjacent tunnel.

Portions of the tunnel that were brick-lined required removing the brick and everything behind it, supporting it with lattice girders, rock bolts and Shotcrete and installing waterproofing before placing the cast-in-place final lining.

Turkey Creek Tunnel, Kansas City, Mo.: This tunnel for the U.S. Army Corps of Engineers involved the rehab of a 1,261-ft long, 87-year-old drainage tunnel that was failing. Merco, again partnered with Obayashi, was contracted to bring the tunnel up to date.

The project involved removing
muck, reconstructing the invert and relining the tunnel. “This project involved Shotcrete, mass grouting, contact grouting, rock bolts, dewatering – the full range of activities and construction techniques that can be done in a rehabilitation job,” Michael said. “That demonstrates our abilities as a contractor to provide custom solutions to the owner.”

Adapting to a Changing Market

“The market is much more competitive now than when we started the company in 1991,” Steve said. “There is a great need right now for new and rehabilitated infrastructure that eventually has to be done, and I think you’ll see more companies entering the market as a result.”

Another area the Mergentimes see as a key to running a successful company is developing and retaining employees in the family-run organization. “We have some really good people in the organization who are coming along and helping the company grow,” Michael said. “That demonstrates our abilities as a contractor to provide custom solutions to the owner.”

He added that although the company welcomes growth, the brothers want to maintain an advantage in the niche they have carved out. “We want to be able to bid some bigger jobs, but at the same time we want to keep some of the flexibility that we enjoy as a small company,” Michael said.

“There are larger companies out there that bid the TBM work or the mass excavations that we don’t chase. We see ourselves in position to compete on the medium-size work and help owners find innovative solutions to their problems.”

But that doesn’t mean that Merco will stand still. “The market is constantly changing so we always have to reinvent ourselves,” Steve said. “We have to look at new methods and technologies to stay ahead of the curve.”

James W. Rush is editor of TBM.
New York City’s East Side Access Project has been in the works for more than 30 years. The construction is needed to relieve heavy commuter traffic congestion between Queens and Manhattan. When operational in 2013, the new rail line will serve approximately 160,000 commuters daily. The project will require the construction of logistically challenging tunnels and underground caverns. Many of the tunnels will pass close to existing subway lines and underground utilities, as well as through building and roadway foundations, requiring extensive monitoring and structural reinforcement.

Making Connections
The project includes two tunnels for trains traveling in both eastbound and westbound directions. The new route will allow travel from Manhattan to Queens underneath the East River via an existing submersed tube tunnel. At a cost of $6.3 billion, the project will utilize hard rock TBM excavation for the Manhattan Approach Tunnels running up to Grand Central Terminal, as well as earth pressure balance machines for tunnels on the Queens side. The TBMs will travel through the existing 63rd Street tunnel running underneath the East River, which was partially excavated in the 1970s then cancelled due to lack of funding.

Under the current contract for East Side Access, both of the 8.5-mile long Manhattan tunnels will be excavated directly under major structures in New York City, including Park Avenue and Metro-North Railroad lines. As they approach Grand Central Terminal, the tunnels will bifurcate to form four tunnels. Ultimately, two underground chambers with upper and lower levels will be excavated underneath Grand Central Terminal for commuters to travel on the new rail lines. The stations, which consist of 60 ft wide x 60 ft high x 400 ft long chambers, will be excavated using drill-and-blast techniques in gneiss and granite geology.

Contracts for the Manhattan tunnels (both eastbound and westbound) were awarded in 2006. A Double Shield TBM has been launched to bore the eastbound tunnel, while a Robbins Main Beam TBM is currently being shipped to begin boring the 7.7-mile long westbound tunnel in October 2007. The westbound contract was awarded to Robbins by the Dragados/Judlau JV for a TBM, back-up system, and spare parts, as well as continuous conveyors to be shared by both tunnels.

Monitoring Project Impact
The dense urban surroundings of the jobsite required special procedures during geological testing, which will continue throughout the project. Many types of methods were used to determine the viability of the ground in the busy area, which includes a network of utility lines, subway lines, the Metro-North Railroad, Grand Central Terminal, building foundations, vaults and heavily trafficked roadways.

The rock under Manhattan is generally classified as Manhattan schist, with some gneiss as well. Overburden deposits vary widely throughout Manhattan and consist of glacial till, sands, gravels, silts and clays, though groundwater infiltration is relatively small. The
tunnel design consultants, a Parsons Brinckerhoff/STV joint venture, subcontracted Jersey Boring and Drilling (JBD) to drill exploratory boreholes, install piezometers to monitor groundwater levels, conduct laboratory and in situ testing, and conduct packer tests for rock permeability. Temporary closures of utilities, roadways and subway tunnels were required to conduct the tests.

The rock in the Manhattan tunnels was determined to be a combination of schist, gneiss and granite, with a UCS of 11,600 to 29,000 psi and two fault lines. Tunnel lining will consist of cast-in-place lining in weak areas, and possibly a combination of steel ribs, wire mesh and rock bolts in other areas as a temporary lining.

Monitoring meters have also been installed inside some of the boreholes located in existing tunnels, subways and structural foundations. The instruments will transfer real-time data via telephone lines to a computer center operated by the MTA in order to monitor vibration, temperature and movement during the tunneling operations.

Innovative Muck Removal

With the recent launch of the 22-ft diameter Double Shield machine for the eastbound tunnel, Robbins has installed a unique and extensive continuous conveyor system. Currently installed components transport muck from the eastbound tunnel across a busy roadway for storage in the Sunnyside Rail Yard 490 ft away. Once the westbound TBM is in operation, the muck will travel from both TBMs on two conveyors, then dump onto an 8,000-ft cross conveyor. From the tunnels, muck is then transported up the 75 ft deep Queens shaft using a steel cable vertical conveyor. At the top of the shaft, the muck is transferred to the Rail Yard using three overland conveyors and a radial stacker. The second overland conveyor, 120 ft in length, crosses Northern Boulevard, a major thoroughfare in Queens. This conveyor has been designed as a totally enclosed box truss with 6-in. wide flange beams at all four corners to support it approximately 20 ft above the roadway and under existing MTA rail lines. The truss conveyor discharges onto another overland conveyor and then to the radial stacker conveyor in the Sunnyside Rail Yard. The continuous conveyor system,” explained Dean Workman, product manager of Robbins Conveyor Division. “Space constraints and the location of the muck storage site meant that conveyors were the only feasible option for muck removal.”

In general, conveyor systems are an important option for muck removal in densely urban jobsites. “Conveyors are relatively quiet compared to muck cars, and are the most non-invasive method. Muck cars also require more maintenance and are less efficient on longer tunnel lengths, where they must keep up with the excavation rates of high-powered tunnel boring machines,” Workman said.

Designing for Efficient Boring and Swift TBM Retraction

The 22-ft diameter Robbins Main Beam TBM is specially designed for quick removal and transport, without major disassembly. The design will allow the TBM to be retracted through varying cross sections of tunnel in order to bore a second heading into Grand Central Terminal.

The cross sections consist of pre-excavated portions of the 63rd Street Tunnel. Though most of these sections are lined, cross sections tend to be rectangular-shaped rather than circular. The submersible tube has a smaller cross section than the rest of the tunnel, at 15 ft wide x 15 ft tall. The non-circular cross sections, together with a 3% upgrade of the tunnel floor, require modifications of both the TBM and back-up system.

The TBM is designed to face these challenges using a segmented, bolt-only cutterhead for simplified disassembly. Hydraulic extensions of the vertical, front, roof, and side support structures allow the diameter of the TBM to expand and retract as needed for swift transport in varying cross sections. These expandable components mean the TBM can fluctuate from 20.0 ft in diameter when fully retracted to 22.6 ft when fully extended. To deal with sloping floors, rails will be installed at precise elevations along the back-up and shims will be placed under the ties.

To monitor TBM performance throughout the project, a newly designed data logging system has been installed radial stacker can rotate through 60 degrees to deposit muck in a kidney-shaped pile with a capacity of 11,000 cubic yards.

The extensive system, weighing in at 900 tons, also made for a challenging installation. Completion of the enclosed box truss required that Northern Boulevard be temporarily shut down and traffic re-routed. A temporary support tower was built in the center of the road so that the two halves of the box truss could be lowered in by crane and bolted. The whole conveyor was then set atop A-frame bents on either side of the road.

“A number of factors governed the decision to use a
on the machine. Real-time meters allow the measurement of parameters including cutterhead motor amperage, cutterhead power and gripper cylinder pressure based on a single TBM boring stroke. Data is relayed to computers viewable by Dragados/Judlau crews to allow monitoring and adjustment of all TBM equipment. Data can also be generated in graphic form to view trends over time.

**Launching and Retracting**

Prior to its launch, the westbound TBM will be partially assembled at the bottom of the 75 ft deep Queens Shaft. The TBM will then be transported through the submerged tube and 1.6 miles of existing tunnel for final assembly in a 22-ft diameter, 65-ft long assembly chamber.

TBM launching and retraction are very particular given the narrow size of various sections of the tunnel. TBM outer components, including the outer segments of the cutterhead and hydraulic supports, will be transported to the assembly chamber. The “core” of the TBM, including the inner ring of the cutterhead, the main beam, gripper assembly, and drive units, will be assembled at the bottom of the shaft, directly on specially designed transport dollies supplied by Robbins.

The dollies, on rails, will allow the partially assembled TBM to crawl forward as back-up decks are added. The back-up system will be partially built with a feature that allows some components to be shifted inward in order to accommodate the smaller diameter of the submerged tube. Once the back-up is assembled, the transport dollies will allow the TBM to crawl slowly forward through the submersible tube and into the assembly chamber for final assembly and TBM launch.

Retraction after the TBM has bored its first length of 1.4 miles will be a similar process. High-capacity transport dollies will lift the nearly fully assembled TBM and transport it back through the freshly bored tunnel after removal of the outer cutterhead, ring beam erector and roof shield fingers. The TBM will then be re-launched from the assembly chamber, approximately 1,000 ft away from the first bore.

Overall completion of the Manhattan approach tunnels is expected to take about one and a half years. Contracts for the additional soft ground tunnels and excavation of the underground chambers underneath Grand Central Terminal will be awarded in late 2007. The East Side Access project is one of several current projects for the MTA in New York City, totaling more than $12 billion.

**Desiree Willis** is a technical writer for The Robbins Co. She is based in Kent, Wash.
Today’s energy crisis has us asking, “What will we do when the oil runs out? Will we ever break our dependency on crude oil?” With prices continuing to climb, we hold our breath and hope someone finds the answer before it’s too late.

While many companies endeavor to harness the power of the wind, the sun and even the atom as potential energy alternatives, some are attempting to unlock the energy hidden in the earth. It may be that the energy of the future rests 1,000 ft below the Colorado desert in the form of oil shale.

Oil shale is a sedimentary rock that contains kerogen, an undeveloped form of petroleum that can be extracted and converted into liquid fuels. The United States holds the world’s richest oil shale deposits, an estimated 1.5 trillion barrels of oil – or more than five times the stated reserves of Saudi Arabia.

Northwestern Colorado, in particular, has been considered a potential oil treasure for a century. As early as 1910, the Navy began developing the Naval Petroleum and Oil Shale Reserves Program. In the 1970s, Presidents Ford and Carter encouraged and funded the development of shale deposits in the West. A shale boom ensued. Oil companies began investing heavily in Colorado, Wyoming and Utah. By the early 1980s, however, several oil companies closed their projects due to high operating costs eating away at profit margins. Extracting oil from shale, it seems, is no simple task. The current process, called “retorting,” is difficult, expensive, and labor and energy intensive. In 1982, the shutdown culminated with Exxon’s closing of Colony Oil Shale in Parachute, Colo., a measure that resulted in 2,500 lost jobs.

Energy Potential Underground

Today, emerging technology promises to breathe new life into this broken dream. After the collapse of oil projects in Colorado, Shell quietly continued laboratory and field research. They developed a promising method for the ground recovery process, known as the In-situ Conversion Process (ICP). Since 1996, Shell has successfully completed small field tests on its privately owned Mahogany property in Rio Blanco County, Colo. With this new method, Shell projects that it could produce oil from shale at the economically competitive price of $30 a barrel.

ICP effectively lays the technical groundwork for a fundamental shift in oil economics, and once again oil companies are interested in the West. However, since most of the nation’s oil shale reserves rest under the control of the U.S. government, the next move is in the hands of the Bureau of Land Management (BLM). The BLM recently received 10 applications (by eight companies – a mix of publicly traded oil giants and a few privately held innovators) for pilot development of Colorado’s shale reserves. The program allows the companies access to public lands for testing shale extraction technologies. BLM’s development of the gas-rich Roan Plateau calls for drilling to be restricted to about 320 acres at a time. Each company will not be allowed to move to another area until the previous one is reclaimed. BLM projects that 1,570 new wells could be drilled in the planning area over 20 years.

Williams Highlands, a regional oil and gas company, already has eight wells in the area and plans to drill...
another. The first obstacle hindering Williams Highlands’ plans was how to get the equipment, materials and workers in and out of the drilling area. Williams Highlands needed a more direct route from the office in Parachute to the Allen Point lease area. Williams Highlands’ Wheeler Gulch Project called for a new road to cut into the side of a steep canyon in a series of four switchbacks and enter a tunnel at about 8,000 ft in elevation.

For this massive project, Williams Highlands turned to Kiewit Western Co., a subsidiary of Kiewit Corp. Started in 1884, Kiewit has constructed miles of interstate highways and bridges, along with mass transit systems, airport runways, canals, dams and tunnels. They have the largest privately owned fleet of construction equipment in North America, which allows them to rapidly mobilize the necessary resources for any size project. They live by their fundamental goals of, “Build quality projects safely, on time, on budget, and with no surprises.”

Turning to Roadheaders

For excavating the 3200-ft long tunnel, Kiewit used a heavy-duty MT 720 roadheader manufactured by Sandvik Mining and Construction, one of the world’s leading suppliers of drilling and excavating equipment.

Roadheaders are powerful, self-propelled rock-cutting machines designed to excavate roadways, tunnels and chambers continuously without using explosives. Their ability to excavate the desired profile without causing harmful vibrations is highly valued for both environmental and safety reasons. The Sandvik MT series of roadheaders for construction are equipped with powerful geometrically optimized transverse cutterheads to give the best cutting performance in a wide range of rock formations. The MT 720 is a heavy-duty boom-type roadheader in the 100-ton class and is outfitted with an automatic profile and directional control system.

Kiewit said the roadheader excavation provided three major advantages vs. drill-blast:

- The daily advance rate was 50 to 100 percent higher
- High accuracy of the tunnel profile and direction
- The smooth excavation provided improved safety – namely against rock fall – and reduced support costs due to virtually no overbreak.

The Wheeler Gulch tunnel dimensions are 3,200 ft long, 24 ft wide by 20.5 ft high, with a flat back. The tunnel slopes at a 12 percent gradient. Ground support for the tunnel includes No. 8 pattern rock bolts with welded wire mesh. The Wheeler Gulch project also included the excavation of a 340,000-cu yd pad and associated access roads, which were excavated using drill-blast method. The total excavation was in shale, with a compressive strength of 85 MPa, on average.

Started in fall 2006 and completed last March, the road and tunnel up Wheeler Gulch and through Allen Point is an important first step for Williams Highlands and for the next phase of oil shale development.
While there has been a long history of slurry tunneling for remotely controlled microtunnel applications in the United States, the West Side CSO project in Portland is widely recognized as the first domestic use of the technique for a large-diameter, man-entry tunnel boring machine.

The slurry technique has been generally accepted and utilized overseas, but the adaptation here has been slow due to several reasons, including overall project costs and contracting practices based on the lowest possible bid price. That may be changing, however, as the West Side CSO project served as a successful case history for other owners and engineers considering specifying the use of slurry TBMs.

Background of Slurry Tunneling

The idea of using a shield, slurry and air pressure to control the face for tunneling operations is not new. In fact, components of modern slurry tunneling date back to subaqueous tunnels constructed in New York and London in the mid to late 1800s. In fact, in 1874, J.H. Greathead patented a shield “that had a face through which slurry could be circulated under pressure to support the face and remove the spoil,” according to the Tunnel Engineering Handbook. Additional designs using slurry and pressure included E.C. Gardner in Houston in 1960, J.V. Bartlett in London in 1964 and Wayss and Freytag AG in Germany in 1974.

Wayss and Freytag worked in conjunction with Herrenknecht on its slurry machine, and the resultant Mixshield began to gain acceptance throughout Europe, particularly for metro projects in urban areas, according to Jack Brockway, senior vice president of Herrenknecht Tunneling Systems USA. “The slurry technology started in Europe and has been spreading throughout Asia,” Brockway said. “Now we are beginning to see more and more interest in the United States.”

Slurry tunneling provides an alternative method of mechanized soft ground tunneling to the earth pressure balance TBM method that has been widely used in the United States. As opposed to EPB which uses a screw auger to form a soil plug, slurry tunneling uses liquid – the slurry – and a pressurized chamber to counterbalance earth and water pressures.

Slurry machines are particularly adept at tunneling through conditions that include high water pressure and flowing ground, whereas EPB machines are favored in areas with clayey soils and lower groundwater heads.

But despite a long track record of slurry tunneling in Europe and Asia, its use has been slow to catch on, until now, that is.

Portland’s ‘Big Pipe’ Project

As part of a $1.2 billion combined sewer overflow control program, the West Side CSO project in Portland, Ore., is recognized as being the first large-diameter tunnel project in the United States to use slurry technology.
The tunnel spans 18,250 ft of 14-ft tunnel along the western bank of the Willamette River in downtown Portland. The ground conditions included sand/silt alluvium. Because the ground was more running in nature than clay, which is well suited for EPB, and had high head pressures, project planners decided to specify slurry tunneling.

“In looking at the geologic profile, which was 100 ft below the groundwater table, we thought that slurry would be a good fit,” said Paul Gribbon, CSO tunnel project manager for the Portland Bureau of Environmental Services, the project owner. “It was a bit of a gamble considering that we couldn’t find a record of its use in the United States, but it seemed to be the most appropriate technology for the job.”

The Portland project used a “cost plus fixed fee” approach that incorporated a two-step, qualifications-based approach. Historically in the United States, tunnel contracts are awarded to the lowest responsive bidder, which has had a limiting effect for using new technology.

“Slurry tunneling is a more expensive process than EPB,” said Glenn Boyce, a consultant for Jacobs Associates who was involved in the West Side CSO project while working for Parsons Brinkerhoff. “Slurry requires separation plants, screens and cyclones to remove the spoil from the slurry and send it back through. There is a lot more equipment involved and it is typically more expensive to acquire, so when a contractor is choosing means and methods to submit the lowest bid, slurry tunneling has been avoided.”

Boyce added that most owners are reluctant to specify equipment in conjunction with a low-bid contract, instead allowing the contractor to select the means and methods in accordance with traditional practice.

In selecting the contractor, Portland considered experience with the slurry technique. Italy-based Impregilo, which had experience with slurry tunneling in Europe, was ultimately selected as the contractor in a joint venture with S.A. Healy.

The West Side CSO project was completed early with advance rates better than anticipated.

Ultimately, the reason to use EPB or slurry is to control the ground and minimize surface settlement. The project team felt that because of the high groundwater head, slurry was more likely to keep settlement to a minimum in the downtown area and near crucial infrastructure likes roads and bridges.

“If you’re going under a river, settlement isn’t as much of an issue, but in this case we were going downtown and we knew we had sandy soils that were better suited to slurry,” Boyce said.

Because of the success of the West Side CSO, Portland is using the same approach on the second component of the Big Pipe tunnel program, the East Side CSO. Awarded to Kiewit/Balfour Beatty, the contract calls for six miles of 22-ft diameter tunnel. “The method worked well for us on the West Side, so we saw no reason to change our approach for the East Side,” Gribbon said.

### Future

Now that the Portland West Side CSO project has been successfully completed, there is an increased awareness of and interest in slurry tunneling. “The demand is there,” Brockway said. “There is a lot more activity and there seems to be more slurry projects coming in the future.”

New projects include the Brightwater Conveyance Tunnel System for King County, Wash., the Pittsburgh light rail tunnel under the Allegheny River, and the Lake Mead Intake No. 3. “These are going forward with slurry tunneling because of the success of the West Side CSO project,” Brockway said. “If that project had not been successful, owners would have looked at alternate designs.”

Of course, the biggest determining factor in selecting which type of machine is best for the job is the ground. “With an EPB machine, the 3 to 3.5 bar of groundwater pressure is about the limit,” Brockway said. “Beyond that, you really need to consider using a slurry machine.”

Photos by Sue Bednarz, Jacobs Associates (used with permission from the City of Portland Bureau of Environmental Services).

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The last word any contractor ever wants to hear is the word “termination.” Termination is an option that most owners only explore as a last resort. The consequences of termination of a contract may lead to financial ruin for the contractor and may trigger personal guarantees given by corporate owners to sureties under the surety indemnification agreements. For the owner, more delays and more costs may result from a termination, with no guarantees that these costs will ever be recovered. Because termination carries with it severe consequences Courts characterize “default termination as a ‘drastic sanction’ [that] ‘should be imposed . . . only for good grounds and on solid evidence.’ [And] the burden of proof on the issue of justification for a default termination always rests on the [owner].” (Sun Cal, Inc. v. United States, 21 Cl. Ct. 31 (Ct. Cl. 1990).)

The stage of the work may enter the owner’s calculation as to whether to terminate. If the contractor (or subcontractor) is not performing in the early stages, termination may be a better option than waiting until things get even worse. The courts might ask: “If the contractor was so bad to warrant termination, why did you wait until the very end.” Courts also consider the doctrine of substantial completion that states that termination is no longer a viable option when the contract is substantially completed. Every case is unique, and termination usually represents some breaking point in the relation between the parties.

This article discusses the typical contract terms and concepts regarding termination for fault and the circumstances that may lead to termination. There are two types of termination, termination for fault, sometimes called termination for cause or termination for default, and termination for convenience. A termination for fault occurs when the contractor cannot perform its work to the required standards. Termination for convenience is governed by the contract and is a way for the owner to unilaterally cancel the contract even if nothing is wrong with the contractor’s performance. This article will focus on termination for fault, and termination for convenience will be reserved for a later article.

Termination for fault has two components. First is the procedural aspects governed by the contract, such as notice and a right to cure. The second is the substantive aspect, such whether a material breach has occurred.

Procedural Aspects

The federal government’s Federal Acquisition Regulations (FARs) provides a typical framework for contract termination provisions. The FARs state: “[T]he contracting officer shall give the contractor written notice specifying the failure and providing a period of 10 days (or longer period as necessary) in which to cure the failure.” (FAR 49.402-3 Procedure for default) The FARs require that other criteria be established and contain many exceptions and special provisions, so the above requirement is only a general description.

The American Institute of Architects, General Conditions A201-1997, contains similar requirements. Section 14.2.2 states that: “[T]he Owner, upon certification by the Architect that sufficient cause exists to justify such action, may . . . after giving the Contractor and Contractor’s surety, if any, seven days’ written notice, terminate the employment of the Contractor.”
The General Condition prepared by the Engineers Joint Contract Documents Committee (“EJCDC”), provides that the owner must give “the Contractor (and Surety) seven days written notice of its intent to terminate the services of Contractor.” And states further: “Contractor’s services will not be terminated if the Contractor begins within seven days of receipt of notice of intent to terminate to correct its failure to perform and proceeds diligently to cure such failure within no more than 30 days.”

If the owner has failed to follow the termination procedure such as notice, cure and certification as applicable, a terminated contractor may be entitled to recover damages for wrongful termination.

Substantive Aspects

To justify a termination for fault, a contractor must have “materially” breached the contract. This means the breach must be significant. Material breaches of the contract that lead to termination usually happen when the contractor fails to perform the work in a proper or timely manner because of lack of skill on its part, or because of financial problems.

Standard contract provisions often describe what constitutes a material breach. The FARs standard contract, provision 52.249-10, provides: “If the Contractor refuses or fails to prosecute the work or any separable part, with the diligence that will insure its completion within the time specified in this contract including any extension, or fails to complete the work within this time, the Government may . . . terminate the right to proceed with the work.”

Similarly, the AIA A201-1997 General Conditions, Section 14.2.1, states, the Owner may terminate the Contract if the Contractor:

• Persistently or repeatedly refuses or fails to supply enough properly skilled workers or proper materials
• Fails to make payments to Subcontractors for materials or labor in accordance with the respective agreements between the Contractor and Subcontractor
• Persistently disregards laws, ordinances, or rules, regulations or orders of a public authority
• Otherwise guilty of substantial breach of a provision of the Contract Documents

The EJCDC General Conditions are substantially similar to the AIA requirements.

Standard of Review

Critical to understanding a contractor’s rights when a termination occurs is understanding how courts review the owner’s decision to terminate. The owner’s decision to terminate as rendered by a contracting officer, or similar official, in many jurisdictions will only be reversed if the decision to terminate was capricious, arbitrary or clearly in error. Courts generally give deference to the contracting officer’s decisions because the contracting officer is the person usually most familiar with the project. Some jurisdictions, however, make no distinction between government work contracts and private contracts and rule based on whether the contractor was in material breach of the contract and review the termination without any special weight given to the governmental officer’s decision. It may also occur that the owner breaches the contract by interfering with the contractor’s performance. When this occurs the contractor will have a defense to the termination.

Surety’s Role

The surety is typically put to the task of having to respond to the owner’s termination of a contractor for fault. While the owner and contractor can litigate the propriety of the termination for years, the surety is put to the task of responding immediately to the owner’s declaration that the contractor is in default, leaving the financial consequences to be sorted out later.

Upon termination, there are four basic scenarios that can occur. First, the owner can hire a new contractor and charge the cost directly to the surety. Second, the surety can hire a new contractor directly. Third, with the owner’s permission, the surety can hire the terminated contractor to complete the work. This is done with contractors that can perform the work but have financial problems that may have caused the default. Fourth, the surety can tender the penal sum of the bond. Theoretically, the surety can side with the contractor and stand on the sideline and do nothing; but this is rare and seldom seen. In the context of each of these scenarios there are also issues regarding the contractor’s and its corporate owners’ indemnity agreements. The surety has a contractual right to recover its losses from these indemnitors.

Conclusion

Obviously, the best thing is to avoid termination in the first place. To start, contractors need to perform quality work. Next, contractors need to develop good working relationships with the owner and the owner’s consultants. This way, minor disputes that are mere mole hills do not grow out of hand and become mountains. If a contractor is experiencing financial problems, the contractor has options. In such situations, contractors should speak to the surety before performance suffers to see if a financing agreement can be arranged. Experienced sureties recognize that it will cost the surety more in the long run if a contractor is defaulted or is forced to abandon a project. Owners too might be flexible at times. For example an owner may expedite the review and payment of a claim, adjust the schedule pending the review of a claim, or modify the schedule, so that a contractor can continue performance. The bottom line is that termination is in no one’s best interest and all parties should take steps to avoid its undesired results.

Peter Kutil, Esq., and Karl Silverberg, Esq., are attorneys with the firm of King & King, LLP in New York and focus their practice on serving the construction industry. More information is available at their Web site: www.king-king.law.com.
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North American Tunnel
Project Update

CALIFORNIA
Los Angeles
Eastside LRT

Traylor/Frontier-Kemper JV

The Eastside LRT for the Los Angeles County Metropolitan Transit Authority is part of a plan to provide public transportation to neighborhoods in East Los Angeles. The project was completed in July 2007 and de-mobilized.

The project involved a 5.9-mile extension of the Metro Gold Line, which included twin TBM-bored tunnels from 1st and Boyle to 1st and Lorena.


Pacific

Devil’s Slide Tunnel

Kiewit Pacific Co

The California Department of Transportation (Caltrans) is the owner and Kiewit Pacific Co. is the contractor for this $275 million project to construct twin 4,100 lf, 30-ft-wide by 22-ft-tall traffic tunnels approximately 1 mile south of Pacifica. In addition to the tunnel excavation, there are two substantial civil packages, three equipment chambers, nine emergency egress cross passages, the tunnel concrete and finishes, and the Operation, Maintenance and Control (OMC) building.

The Phase I civil work is complete and the tunnel ground breaking was completed on Sept. 17. The tunnel crew began mobilization the third week of September and full scale tunnel excavation is set to begin the first week of October.

The tunnel will be constructed through granitic sandstone, and shale formations using the NATM approach. Drill-blast, roadheader and NATM excavation methods will be utilized.

Caltrans has assembled a knowledgeable team that includes Caltrans’ construction and engineering professionals, HNTB, ILF and the Dr. G. Sauer Corp. The Caltrans’ team includes Resident Engineer, John Muench; Structure Representative, Ivan Ramirez; Construction Office Chief, Ed Der; and Assistant Structure Rep - Tunnels, Franz Langer.

Kiewit Team: Project Sponsor: Ray Backen; Project Manager: Sean Menge; Assistant Project Manager: Ryan Sheedy; Tunnel Manager: Todd Cummings; Tunnel Superintendent: J.D. Martin; Concrete Manager: Mark Ramsey; Equipment Manager: Larry Andersen; and Tunnel Consultants: Gall-Zeidler Consultants. Information: (650) 290-3399 or Brian.Fulcher@JFShea.com.

San Diego

San Vicente Pipeline

Traylor/Shelley

The San Vicente Pipeline Tunnel is an 11-mile water conveyance tunnel being built for the San Diego County Water Authority. The 8.5-ft-diameter pipeline will connect an existing aqueduct, feeding San Diego County, to the San Vicente reservoir. The system will provide additional storage during wet periods, and another water source during dry periods or when the main aqueduct suffers a catastrophe.

Due to the varying geology, multiple tunneling methods have been chosen. Two open face shields, equipped with excavator arms, and replaceable roadheader type attachments, will mine the conglomerates. These shields will be manufactured by Construction Tunneling Service. A refurbished Robbins main beam machine will mine the rock sections at each end. Conventional excavation methods will be used in a section of tunnel that interfaces the rock and conglomerate in an unpredictable fashion. Drill-blast, combined with Sequential Excavation Method techniques, will also be used here.

West Shaft Site/Reach 1: Shaft excavation is complete to 115 ft. Excavation of starter tunnel for the rock TBM has been completed to 400 ft. The Robbins TBM has been delivered from Reach 6, and assembled in the starter tunnel. It is currently mining through granite requiring ribs, and has advanced approximately 450 ft. Total Reach 1 length is 4,400 ft.

Central Shaft Site/Reach 4 West: The CTS digger shield has advanced 12,900 ft through sporadically very hard, well cemented conglomerate, to complete Reach 4 West. Excavation of Reach 3, which involves blasting through granite in front of the shield, has recently begun. Ground support consists of precast concrete segments, with backfill grout. Reach 3 is approximately 550 ft long. Slaughterhouse Shaft Site/Reach 5: Reach 5 has been completed, and the Slaughterhouse shaft is used only for access.

San Vicente Portal Site/Reach 6: Support of the second CTS digger shield is from the San Vicente Portal site. This machine is currently 1,500 ft into the conglomerate of Reach 4 East, where the ground has been consistently hard, and difficult to mine. This Reach is 22,000 ft.

Precast Concrete Segments: Manufacture by Traylor-Shelley-Ghazi is complete.

Project Manager: Mike Jatzak Information: (619) 631-0777.

Fountain Valley

Ellis Avenue Trunk Sewer

Barnard/Solelance JV

The Orange County Sanitation District awarded the $31 million contract to the joint venture team of Barnard Construction Company Inc. and Solelance, Inc. NTP was issued on Nov. 14, 2006. Final completion is May 16, 2008.

The Ellis Avenue project is a portion of a $2.5 billion capital improvement program for the Orange County Sanitation District. The project consists of a 1,487-ft, 9-ft diameter rib-and-board supported tunnel. A PVC liner is placed behind the rib and boards to control water inflow to the tunnel. A 66-in. carrier pipe will be installed in the tunnel and the annulus between the pipe and tunnel lining filled with cellular grout. There are a total of eight shafts to be constructed on the project, five of which are to be access manholes to the pipeline. The other three shafts include a junction structure, a diversion structure and an exit shaft for removal of the TBM. The junction structure shaft will serve as the main shaft for mining operations. Camp, Dresser & McKee and Malcolm Pirnie designed this project.

Project Highlights:

* Excavate 45-ft-deep by 45-ft-diameter junction shaft, 16-ft by 25-ft TBM retrieval shaft, and 30-ft by 20-ft-deep diversion structure shaft
* Chemical grout 350 lf of alignment in advance of tunnel excavation to consolidate area of known petroleum contamination
* EYP mine, 5,437 lf of 9-ft-diameter tunnel in soft ground using steel ribs and wood lagging boards for initial support
* Hand-mine 25 lf tunnel for connection from TBM retrieval shaft to diversion structure shaft
* Install 5,500 lf of 66-in. 1D carrier pipe within the tunnels and shafts and grout annulus between carrier pipe and tunnel

TBM mining has progressed past the two-thirds mark. Plans are under way to install the 66-in. Hobas carrier pipe in the tunnel and complete the concrete buildout of the junction chamber and diversion structure.

Project Personnel (Barnard): Dan Schall, Operations Manager; Ben Campbell, Project Manager; Brad Bush and Mickey Aliff, Project Superintendents; Boodie Hurst, Safety Manager; Patrick Stump and Jordan Hoover, Project Engineers; Andy Granger and Bob Cayer, Superintendents; and Ismail Benamar, Tunnel Manager. Information: Shelley Burg (406) 586-1995.
Hailey & Co.; Project Manager: Randy Wieck; Project Engineer: Mark Palmieri, JDH Joint Venture — Resident Construction Manager: Mike Robison; Resident Engineer: Dave Beck; Project Engineer: Ron Davis; Concrete Specialist: Parvez Sheikh; Project Controls Engineer: James Talley; Chief Inspector: Dave Mundis. Information: (404) 352-0701.

Snellville
Owner: Gwinnett County
No Business Creek Tunnel and Pump Station
Mole/Jay Dee/Kassouf/Murray Hill JV

This project for Gwinnett Country was awarded to the joint venture with a bid price of $54,171,143. It is a 12-ft diameter sewer interceptor/storage tunnel, 16,000 ft long with five shafts ranging from 70 ft in depth to more than 240-ft in depth. Also included is the construction of a pump station and odor control facility. Initial mobilization is complete and secant pile support is being installed on the first shaft.

Key Subcontractors and consultants: Lachel Felice & Associates, American Shoring Inc., Reynolds Inc.

Project Personnel: Rod R. Shoulders, Project Executive; Norman A. Gray, Project Superintendent; Ray Venturi, Superintendent; Jake Cobion, Project Engineer; Leveius Bryant, Health & Safety Manager. Information: Rod Shoulders, (440) 248-0616.

Stanford
Stanford Linear Accelerator
Affholder Inc.

This job consists of 1,600 ft of shotcrete-lined NATM tunnel. The first tunnel drive is a curved access tunnel 20 ft by 20 ft, 300 ft long that connects to a 40 ft by 40 ft experimental hall 200 ft long. On the opposite end of the experimental hall is a 500 ft long X-ray tunnel 20 ft by 20 ft. There is a 600 ft long unidirectional tunnel under the next hillside. Mining operations have been completed for the unidirectional hall tunnel and the mud-mat has been installed. Final shotcrete lining is being placed by subcontractor Johnson Western and when completed the invert concrete will be placed.

Top heading mining of the access tunnel has been completed, and crews are currently mining the top heading of the far experimental hall. An adit will be mined into the X-ray tunnel so mining of the X-ray tunnel can commence before completion of the far experimental hall. All mining operations should be completed by the end of the year, with final completion in early spring.

Project Manager, John Forero; Project Engineer, Tolga Togan; Safety Manager, Jack Lynch.

GEORGIA
Atlanta
West Area CSO
Atlanta CSO Constructors

The West Area CSO Storage tunnel and Pumping Station consists of 8.5 miles of 24-ft finished diameter tunnel with three intakes and a pumping station. The two sections of the main tunnel will be mined using two 27-ft diameter Herrenknecht TBM's.

42,400 lf of TBM tunnel excavation is now complete. Clear Creek chamber and tunnel lining work is under way and tunnel lining forms are being mobilized in the North Avenue Tunnel. A portable concrete batch plant has been set up on the Rockdale site to supply tunnel concrete. All underground work has been completed at the Tanyard site, and the 24-ft diameter vent shaft has been lined. Intake work is substantially complete at the Clear Creek and North Avenue structures, with only the Tanyard intake structure remaining. Work on the 85 mgd pump station is being performed by W.L. Hailey as a subcontractor to ACC. Pump station concrete work is approaching completion, and M&E installations are on going.

Project Personnel: City of Atlanta — Construction Manager: Ken Johnston. Atlanta CSO Constructors — Project Manager: Taro Nonaka; Assistant Project Manager: Darrell Liebno; Project Engineer: Kay Hutton; Safety Manager: Barry Jackson, Survey Manager: Bill Girrer, Office Engineer: T.J. Kobayashi; Tunnel Engineers: Adam Stremcha, James McNally, Percy Townsend, Stuart Sullivan, Koichiro Shimomura, Raj Magam, Arash Sayyar; General Superintendent: Jeff Early; Assistant Superintendent: Ray Beesly. W.L.

TBM ANIMATIONS
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Reader Service Number 12
Christian Heinz, Project Engineer; Donn Renfro, Senior Staff Engineer; Ken Dumas, Safety Manager; Richard Dresser, Safety. Information: (847) 541-8200 or TedBudd@kennyconstruction.com.

KANSAS
Kansas City
Turkey Creek Tunnel Rehabilitation
Merco/Oyabashi JV
This project for the U.S. Army Corps of Engineers started in 2006 has been remodeled for the start of season No. 2 with the work on this complex and challenging job. It involves the construction of structural shotcrete lining and mass grouting of the upstream sections of the tunnel. Bypass piping installation commenced in September and will be followed by invert preparation and placement of the structural invert slabs. Repair work along the upstream channel has been completed and preparations for the surface grouting are underway. Project completion is scheduled for June 2008.

M.V. Mergentime, Project Sponsor; Loc Spenser, Project Superintendent; Bogdan Veleu, CQC System Manager; Mike Levoy and Joey Jennings, Tunnel Superintendents; Bob Schoen, Project Manager for the Corp of Engineers. Information: Mike Mergentime, (908) 730-8622.

KENTUCKY
Louisville
Riverbank Filtration Tunnel & Lift Station
Mole/Jay Dee/Murray Hill/Kassouf JV
This project for the Louisville Water Co. was awarded to the joint venture with a bid price of $335,908,000. It consists of a fresh water collection tunnel, 8,000 lf and 12-ft in diameter, and one shaft, 250-ft in depth. Also included in the price are the construction of a pump station and four horizontal collector wells.

The slurry walls for the work shaft are complete and excavation has progressed to a depth of 90-ft. The caisson for Collector Well No. 2 is complete and crews are beginning the construction of the caisson for Collector Well No. 4.


MASSACHUSETTES
Dorchester
Dorchester CSO
Shank/Barletta JV
This project for the Massachusetts Water Resources Authority (MWRA) was awarded to the joint venture with a bid price of $140,000,000. It consists of two miles of 19-ft excavated, 17-ft segment lined tunnel with one-pass lining from a single shaft. Both the mining and receiving shafts have been constructed. The EPB TBM arrived from Japan and was off loaded on Sept. 6. Assembly of the machine is ongoing with completion and start of TBM excavation expected to begin in October. Construction of the six drop shafts connecting to the tunnel are in progress.

Information: Steve Wardwell, (401) 981-1455.

NEW YORK
New York City
East Side Access
Dragados/Judlau JV
On July 10, 2006, the New York City Transit Authority CC awarded the joint venture of Dragados/Judlau the East Side Access Manhattan Tunnel Excavations for a contract price of $427 million. The project is part of the construction program that will allow the Long Island Railroad system into the Grand Central Terminal on Manhattan’s East Side.

The project consists of 25,200 lf of 22-ft diameter hard rock TBM excavated tunnels. There are four total tunnel runs, two are 7,400 ft and two are 5,200 ft. The tunnels start from the existing 63rd Street terminal. The job shaft will be in Long Island City in Queens and crews will have to travel 8,800 ft to the heading. The drill and blast excavation consists of two large crossover caverns between tunnels that will be lined with reinforced concrete. Approximately 11,000 ft of excavated tunnel will be concrete lined. The project duration is 48 months.

This summer, Dragados-Judlau has completed both starter tunnels and assembly of the first TBM. The second TBM is currently being delivered on site from The Robbins Co.’s Ohio yard. The Robbins conveyor systems, which include an 8,800 lf stationary existing tunnel conveyor; 90-ft vertical shaft belt and 800 ft of overland conveyors to a discharging stacker conveyor; are finishing installation and testing is ongoing. The first TBM is near completion of assembly including backup, and testing is to begin just after Labor Day with mining starting after completion of testing. The second TBM will begin being assembled early September and should begin mining in early November.

Project personnel — Project Executive: Jose Miguel Gonzalez; Project Manager: Don Hickey; Project Engineer: Joaquin Fernandez and Julio Velez; Job Superintendent: Denis O’Neill; Equipment Manager: Louis Sanchez; Survey Superintendent: Jim Skura; General Superintendent: Terry Beesley; Equipment Superintendent: Jim Dieley. Information: Don Hickey, (718) 321-1818.

New York City
Water Tunnel No. 3, Stage 2, Contract 538C
Schiafone/Frontier-Kemper/Shea JV
New York Water Tunnel No. 3 currently being constructed by Schiafone/Shea/ Frontier Kemper JV involves excavation of 27,178 lf of 12-ft, 6-in. tunnel, concrete lining of 45,889 lf of tunnel to a finished diameter of 10 ft, excavation and lining of nine shafts approximately 500 ft deep, installation of stainless steel pipes in the shafts, and building distribution chambers at the top of the shafts.

Crews have completed 15,700 ft of concrete lining in the South Tunnel and 11,517 lf of concrete lining in the North Tunnel. Currently, crews are moving the forms to the East Tunnel to begin concrete lining operations, and are starting grouting and patching operations in the South Tunnel. Shafts 31B, 30B, 29B, 28B, 27B and 24B have all been constructed. Shaft 25B will be completed this summer and Shafts 32B and 33B will be finished this fall. The stainless steel pipe valve has been installed in Shafts 27B, 25B, 29B and 31B. The pipe is currently being installed in Shafts 30B, 28B and 24B. Crews have also started to build the Distribution Chambers for Shafts 31B and 29B.

Excavation and final lining of five south shafts is completed and shafts are turned over to subcontractor J.P. Picone for installation of final stainless steel piping and fill concrete. Out of four north shafts, one shaft remains to be raised bored, while slashing and concrete placement operation are taking place at three shafts. Final contract completion is in July 2009.

Schiafone Project Manager: Anthony Del Vescovo; General Superintendent: Dale Estus; Project Engineer: Florentino Sison. J.F. Shea Shaft Manager: Shemek Oginski; Shaft Superintendent: Mike Jennings; Shaft Project Engineer: Jim Rostock. Information: (212) 564-8552.

NEW JERSEY
Sayreville
Raritan River Crossing
Kenny Construction
On July 10, 2007, Kenny Construction was issued a NTP by the Middlesex County Utilities Authority for the force main tunnel under the Raritan River. The $41,150,000 project consists of 280-ft deep caisson shafts on either side of the river and 3,900 ft of 15-ft, 6-in. diameter segmental lined tunnel. A Lovat EB TBM will be utilized along with compressed air interventions. Once the tunnel is complete, two 60-in. force mains will be installed and partially encased, leaving an access walkway above the pipes for inspection purposes. Mobilization was scheduled for early September.

Personnel: Ted Budd, Tunnel Division Manager; Bob Rautenberg, Project Manager; Mark Saylor, Equipment Manager; Mike Smithson, Project Sponsor; Joe Johnson, Electrical Superintendent; Tom Peterson, TBM Specialist. Information: MSmithson@kennyconstruction.com.

NORTH CAROLINA
Charlotte
Wachovia/Knight Theatre Tunnels
Bradshaw Construction Corp.
Bradshaw Construction has been awarded a design-build contract to construct two pedestrian tunnels under the streets of downtown Charlotte to connect a new performing arts center to underground parking. The work is part of Wachovia
Bank's First Street Development Project. Teamed with Jenny Engineering Corp. of Springfield, N.J., a concept was developed including initial/final lining NATM and waterproofing and a cast-in-place floor.

The subsurface conditions include rock and mixed face tunneling with about 16-ft to 20-ft of cover. The 13-ft high x 16-ft wide finished horseshoe shell will be fitted with an architectural finish corridor in a follow on contract.

Project Manager: Eric Eisold; General Superintendent: Jerry Simon; Design Engineers: Prakash Donde and Iwona Tarchala (Jenny Engineering).

**Ohio**

**Cleveland**

**Mill Creek Contract 3**

K&M&K JV

Concrete final lining to a 20-ft ID is complete. Shaft construction and connector sewer installation continues.


**Columbus**

**BWARI**

Jay Dee/Michels/Traylor JV

The tunnel has been cleaned and currently working on the installation of the liner, which is a bond lining required for the full length. Crews have completed approximately 30 percent of the lining and anticipate completion in mid-January 2008.

Personnel — City of Columbus, Division of Sewerage and Drainage: Gary Gilbert, Civil Engineer; City of Columbus, Division of Sewerage and Drainage: Tanya Arsh, Sewer System Engineering Manager; URS Corp.: Designers: Douglas Uhren and Tom Richardson; HR Gray, Construction Management: Robert Scott, Sr. Mgr., James Joyce; Lachel & Assoc., Geotechnical Design: David Chapman and Glen Frank. Contractor: Jay Dee/Michels/Traylor JV; Michael DiPonio, Project Manager; Mark Lafaze, Project Engineer; Tim Avrald, Project Superintendent. Information: (614) 491-5951.

**Columbus**

**BWAS II**

McNally/Kiewit JV

This project consists of a 167-in. excavated diameter, 144-in. inside diameter concrete segment lined, 13,200 lf excavated tunnel approximately 60 ft below surface. It also includes one work shaft, four access shafts and one interconnected structure at the end. The geology is glacial clay, tills and sands with boulders. Included also is 5,000 lf of surface sewer with two 400-ft lengths of pipe jacking.

Project Sponsor: Larry Lenahan; Project Manager: Tom Szaraz; Project Engineer: Gary Bull; Project Superintendent: John Herward. Information: (614) 491-2800, Fax: 614-491-2802.

Columbus

**BWARI**

Kiewit/Bilfinger Berger (KBB) JV

Mobilization to all seven primary shaft site locations has been complete with slurry walls in place on four shafts. Each of the seven shafts are approximately 30 ft diameter and 150 ft deep, and located more than 100 ft below groundwater. Shaft excavation and tremie slab placement has been performed on two shafts while crews currently work at the third site.

After completion of all equipment, plant and utilities at the main mining site, excavation of the 25-ft diameter slurry tunnel began with completion of the initial tunnel section and installation of all TBM trailing gear. The 30,000-ft long tunnel will be finished with a precast segmental lining that is currently being fabricated in Portland by KBB and is approximately 15 percent complete. The tunnel is divided into several drives along the alignment separated by the seven shafts. The first drive is approximately 4,200 lf where the TBM will enter the first shaft by the end of 2007.

A slurry microtunnel boring machine is being used to complete more than 6,000 lf of pipeline in depths up to 50 ft. The first of multiple drives has been finished and crews are currently preparing to launch the next drive, which will be 1,100 ft in length. In addition, a 200-ft long jack-and-bore tunnel has also been completed.

Project Director: Bill Mariucci; Project Manager: Tom Corry; Safety Manager: Paul Weisheit; Quality Manager: Glen Tomack; Engineering Manager: Tony O'Donnell; Site and Shaft Manager: Scott Wimmer; Tunnel Manager: Christof Metaguer. Information: (503) 290-7000.

**Pennsylvania**

**Pittsburgh**

**Pittsburgh Light Rail Tunnels**

North Shore Constructors JV (NSCJV)

North Shore Constructors, a joint venture of Obayashi and Trumbull Corp., will be constructing 2,200 lf of 20-ft ID twin tube tunnels using precast segments underneath the Allegheny River, cut-and-cover tunnel including station shell, and
launch and receiving pits for the tunnel boring machine. Current work includes completion of utility relocation, site preparation, support of excavation and TBM assembly. Subcontractor Nicholson Construction has completed jet grouting on the North Shore and is relocating to the downtown receiving pit area. Nicholson has also completed the CDSM wall on the North Side around the launch pit and cut-and-cover sections. The CDSM wall operation will also relocate to the South Side and receiving pit area. Excavation of the launch pit and cut-and-cover sections is well underway with the launch pit excavation scheduled to be completed in early October 2007. SR-65 underpinning work is also in progress. The Harrenknecht 23-ft diameter mixed face slurry TBM and separation plant arrived on site mid-August. TBM and separation plant assembly have begun. Initial mining is expected to start in November.

Technopen is assembling its segment manufacturing equipment at the AC Miller plant. Segment production will begin in early October.

Major subcontractors currently working: Nicholson Construction - CDSM and slurry walls, jet grouting; Brayman Construction - drive piles, piers, and lagging; Moretrench - dewatering.

Personnel: Asao Nomura, Project Manager; Paul Zick, Project Director; Hiroaki Sugihara, Deputy Project Manager; John Murray, Construction Manager; Shu Mino, Project Engineer; Kenji Yamauchi, Tunnel Engineer; Daikoku Sone, Mechanical Engineer; Russ Pollard, Chief Field Engineer; Mike Rostani, Safety Supervisor; Randy Marnhout, General Superintendent; William Gyofi, Site Superintendent; Vince Kraynak, Utility Superintendent; Joe Restelli, Electrical Superintendent.

TEXAS Round Rock Mole/Kassouf/Murray Hill

The joint venture was awarded the contract with a low bid of $10,128,830 for the construction of a sewer interceptor tunnel 8,340 lf, 8-ft diameter excavated diameter tunnel with Hoba 48-in. pipe liner. The project includes three shafts ranging in depth from 50 to 70 ft and the construction of one pump station. The tunnel and shaft excavation and lining is complete and construction of the pump station is well under way.


Personnel: Norman A. Gray, Project Manager; Mike Clingon, Project Superintendent; Alesia Beck, Project Engineer. Information: Rod Shoulder, (440) 248-0616.

VIRGINIA Richmond

Battery Park Emergency Trunk Sewer Replacement Sewer Project

Bradhaw Construction Corporation

This $25 million project is an emergency, time-of-the-essence project. A major trunk sewer in the Battery Park area of Richmond collapsed as a result of Tropical Storm Ernesto in August 2006. This project is a replacement of the section of sewer that collapsed. Notice to proceed was given in April 2007.

The project consists of 3,400 lf of digger shield excavated rib and boards tunnel with a final liner of 110-in. diameter FRRP provided by Future Pipe, a 30-ft diameter main work shaft. The School Street Shaft, 70-ft in depth located mid-point of the tunnel which will serve as the excavation for a 60-ft drop structure and connection to an existing sewer; a diversion structure at either end of the tunnel where it ties into existing sewers, an offset 72-in. drop structure to be constructed in a 30-ft diameter NATM shaft. The North Connection Shaft, 60-ft in depth over an existing 72-in. RCP sewer with a 102-in. diameter hand mined liner plate connecting tunnel in which a 72-in. FRRP will be installed to tie into a 110-ft FRRP main line, 200 ft of 60-in. jacked RCP; 1,000 ft of 48-in. jacked RCP; 400 lf of open cut 48-in. RCP; and 500 ft of open cut 12-in. RCP. An Akkerman 144-in. digger shield was used to excavate the tunnel, an Akkerman 480 TBM was used for the 48-in. jacked RCP and an Akkerman 600 TBM will be used for the 60-in. jacked RCP.

Excavation of the main work shaft, the School Street Shaft, began in April and took approximately one month to excavate and support. The downstream tunnel drive, approximately 1,500 lf, began in June and took one month to complete. The upstream tunnel drive, approximately 1,640 lf, began in July and took one month to complete. The North Connection Shaft began in June and was completed in eight weeks.

Work is in progress on the 110-in. FRRP installation, construction of the two diversion structures, the 72-in. connection at the North Connection Shaft, the jacked 60-in. RCP and the open-cut RCP. The 60-ft drop structure and connection at the School Street Shaft will be the last construction activity on the project. All work is expected to be completed by Jan. 11, 2008.


WASHINGTON Seattle

Beacon Hill Tunnel Contract

Obayashi Corp.

The TBM was re-launched in July on the northbound running tunnel and is approximately 600 ft in and making good progress toward the station. The TBM will hole through at the station toward the end of September. The TBM will then be pulled through the station and set up for re-launch on the final running tunnel segment.

The SEM mining work at the station is complete as of May 2007. Work continues on waterproofing, permanent lining concrete and main shaft. The 1,400 lf of aerial structures work at the East Portal is substantially complete and work continues on miscellaneous concrete and steel erection for the Mt. Baker Station. Aerial guideway work on the West Portal is under way and will be complete in September 2007. Pileth operations and rail works on the aerial structure are substantially complete with final portal concrete works ongoing.

Obayashi Job Site Personnel: Masaki Omote, Senior Project Manager; Steve Redmond, Project Manager; Jon Kirk, Business Manager; Richard Boutelle, General Superintendent; Rohit Shetty, SEM Tunneling Manager; Neto Jacquez, SEM Tunneling Superintendent; Nestor Garavelli, TBM Project Engineer; Bob Chucas, Structural Manager; Gregg Olsen, Project Engineer; Billy Hahn, Safety Manager; Leif Nordell, Tunnel Concrete Superintendent; Duke Willhite, Surface Superintendent; Satoshi Akai, SEM Engineer; Yoshi Sawamoto, Equipment Manager; Tono Kudo, EPB Tunnel Engineer; Mat Matsamoto Structural Building Engineer; Brent Buzzard, Estimator. Information: Jon Kirk (206) 282-0065.

Sound Transit Job Site Personnel: Richard Sage, Deputy Construction Manager; Rick Capka, Resident Engineer; Zeph Varley, Station Project Engineer; Clement Wiggins, Tunnel Project Engineer; Roger Smith, Resident Engineer Structures.

Bothell Brightwater Conveyance System - East

Kenny/Shea/Traylor

This is the first of the major projects scheduled by King County to complete the Brightwater System. The East Contract consists of the following major elements: 14,050 ft of 18-ft, 10-in. EPB TBM-mined tunnel using 16-ft, 8-in. ID bolted, gasketed precast concrete segments for a primary liner; installing and grouting 14,200 ft each of 48-in., 66-in., 27-in., 84-in. diameter pipes inside the tunnel along with three runs of fiber-optic cable; 2,430 ft of 72-in. diameter microtunnel, including three shafts and structures; one intercepting structure (IS) to mine from that is 74 ft deep and 80 ft finished diameter with 130 ft deep slurry diaphragm walls, tremie slab and final concrete wall lining; one influent pump station shell (IPS) 83 ft deep, twin 84 ft ID cells, with 160 ft deep slurry diaphragm walls, tremie slab, and final lining; two short 12 ft diameter connector tunnels; one extraction shaft 40 ft deep by 40 ft wide and 140 ft long for connection to new treatment plant piping.

The site utilities and screen/sound wall fence were completed and the slurry wall construction for the IS shaft was completed by Bencor Corporation in spite of a six-week setback due to
an operator’s strike against the ready-mix concrete suppliers in King County. Bencor has since completed the binocular twin 84 ft diameter shafts and center wall for the IPS shaft using 160 ft deep by 48-in. thick panels. The IS shaft excavation was completed and the 13 ft thick, 2,600 cu yd concrete tremie plug installed. The shaft was concrete lined back to the final diameter with all the portals installed. Northwest Boring assembled the microtunnel equipment for the first drive out and has completed the first 850 ft drive. The receiving shaft for the first microtunnel drive was completed (80 ft deep caisson) and the second and third caissons have been completed for the remaining drives. The 19 ft, 3 in. diameter Lovat EPB TBM has been delivered to the site and is currently being assembled in the IS shaft. Mining is scheduled to start by the end of September 2007. The IPS slurry wall binocular shaft excavation is well under way with shaft excavation in the wet scheduled to be completed by early October followed by the pouring of the tremie plug, dewatering and final concrete lining.

Personnel: Ted Budd, Tunnel Division Manager; John Kennedy, Project Manager; Jake Taylor, Project Engineer; Luminita Calin, Cost and Schedule Manager; Tony Huphauf, QAQC Manager; Mark Saylor, Division Equipment Manager; Rich Mascarello, General Superintendent; Dale Wold, Electrical Superintendent; Terry Walls, Warehouse Manager; Mike Surlitto, Safety Manager; Safety; Austin Cooney, Home Office Sponsor. Information: (847) 541-3200 or TedBudd@kennyconstruction.com.

Brightwater — West Contract

Jay Dee/Coluccio/Taisei JV

The project consists of approximately 21,100 lf of 13 ft diameter segment lined tunnel, constructed with an EPB TBM, 2,500 lf of which has a secondary lining of 10 ft diameter piping, 540 ft of 60-in. microtunneled effluent sewer, one portal structure for launching the EPB TBM and a sampling facility with structural, mechanical, electrical, piping, landscaping and instrumentation work. The project duration is 49 months with completion scheduled for March of 2011. The JV has almost completely mobilized to the site. Utilities are installed including two prep rammed casings beneath the BNSF RR. The site field offices are set up and the JV has moved to these from the temporary offices in Shoreline. Site grading, drainage and temporary access roads are completed. Several pieces of equipment are mobilized to the site including a new Manitowoc 14000 crane. The JV is currently installing steel sheeting and jet grouting for the main shaft. Water treatment facilities are being completed to treat both process water and storm water. Shops and temporary buildings are nearly completed.

A 15 ft, 5 in. diameter Lovat EPB TBM is being manufactured for the tunnel drive and scheduled for delivery in March 2008. The concrete segments will be fabricated by CSI/Hanson JV in Tacoma. All 21,100 lf of tunnel will be from the shaft portal at Point Wells in Richmond Beach, very close to the shoreline of Puget Sound. Major subcontractors include Delta Technology Corp. for HVAC, J.P. Francis & Assoc. Inc. for plumbing and mechanical, United States Electrical Corp. of Washington for both permanent and temporary electrical work.

Personnel: Thomas S. DiPonio, Managing Partner for the JV; Greg Hauser, Project Manager; Tom McMahon, General Superintendent; Glen Frank, Project Engineer; Mina Shinouda, Assistant Project Engineer; Hiro Uchida, Tunnel Engineer; Andrew Cook, Health and Safety Officer; Bill Austell, Microtunnel Manager; Renee Halley, Office Manager. King County: Mann-Ling Thibert, Project Representative. Bob Mues of Jacobs Engineering is the Resident Engineer and Mike Cole of EPC Consultants is the Assistant Resident Engineer. Ken Rossi of EPC Consultants is the Chief Inspector and John Giaudrone of Jacobs Associates is the Design Engineer. Information: (206) 542-2865.

Brightwater — Central Contract

Vinci/Parsons/FKCI JV

The $210 million contract includes 11,600 lf of 14.33-ft diameter tunnel (BT2) and 21,100 lf of 14.33-ft diameter tunnel (BT3), both steel fiber reinforced segmentally lined. The tunnel excavation will
utilize two Herrenknecht 17.38 ft mixshield machines. The project also includes 3,400 ft of 3- to 5-ft interceptor work constructed by microtunneling and cut-and-cover methods.

The North Kenmore Shaft has been excavated and partially lined. The BT2 machine has been shipped to the site for assembly and launching anticipated for mid-September 2007. The BT3 machine has been manufactured and has completed its workshop testing in Schwanau, Germany. The unit will arrive on site in November 2007 for assembly and launching.

Project Manager: Lionel Suquet; Project Engineer: Yvonnick Rescampe; General Superintendent: Francois DeLille; Tunnel Superintendent: Jim Nickerson; Equipment Superintendent: Greg Cook; Electrical Superintendent: John Issacs; Business Manager: Cheryl Sturdevant. Information: Dave Rogstad, (296) 766-8106.

WEST VIRGINIA
Neal Cavern No. 2
Kiewit Construction Company

The Cavern No. 2 project is a liquid storage cavern consisting of a network of approximately 14,500 ft of 15-ft and 20-ft wide by 27-ft-tall tunnels. The excavation is located in shaft about 460 ft below ground. Access is through an 8-ft-diameter drilled shaft. The tunnels will be excavated using drill-and-blast methods. Ground support consists of pattern resin bolts and full wire mesh in the crown.

The 506-ft main shaft and two ventilation shafts are complete. The head frame and 1,000 hp shaft hoist have been installed. Break-out mining from the 8-ft-diameter shaft is complete. The underground loading pocket excavation and installation is in progress. Production mining is expected to start in late-October.

Project Sponsor: Bob Stier; Job Superintendent: Matt Swinton; Assistant Job Superintendent: Jamie Bonner; Project Engineer: Ricardo Garcia. Information: (304) 453-7000.

WISCONSIN
Milwaukee
Elm Road Generating Plant Intake
Kenny Construction

The project is a design-build subcontract for Bechtel Corp, which is the design-build contractor for the $2 billion plant for WE Energies (Wisconsin Electric) consisting of a lake water intake tunnel excavated in rock approximately 9,200 ft in length, 27 ft, 4 in. in diameter and appurtenant work.

Marine crews have completed the drilling and the installation of the vertical piping in the four drilled intake shafts. Drilling was completed and all of the vertical risers were connected to the previously installed risers below the lake floor followed by installation of manifold piping. This is being followed by the installation of the intake screens to complete at least two of the shafts to fill the tunnel late in 2007 for test water for the new plant.

The overburden excavation using a 32 ft ID caisson method to the rock (80 ft deep) for the first of three land-based shafts was completed and the rock drilled and shot to the top of the tunnel and TBM erection chamber. The 200-ft deep shaft was lined followed by the drilling and shotting of the 30-ft horseshoe erection chamber. The 27-ft, 4-in. diameter TBM was erected and completed mining in early March. The tunnel was cleaned and the TBM cycled back to the work shaft for disassembly and removal. Tunnel concrete forms were erected and the last 8,000 tons of concrete was poured. The forms are currently being placed under the furthest riser shaft. The tunnel intersections of the four risers will be completed and the form cycled back to the land based shaft for removal.

Personal: Ted Build, Tunnel Division Manager; Paul McDermott, Project Manager; Jon Issacs, Project Engineer; Tom Pinke, QA/QC Manager; Mike Smithson, D/B Coordinator; Mark Saylor, Equipment Manager; Joe Johnson, Electrical Superintendent; Dave Kuepper, Site Equipment Manager; Chuck Hartman, Warehouse Manager; Rich O’Neil, Survey Manager; Matt Hadaway, Site Safety Manager; Phil Harris, Safety; Austin Cooney, Home Office Sponsor. Information: (847) 541-8200 or Ted.Buik@kennyconstruction.com.

Milwaukee
Harbor Siphons Project
Shea/Kenny JV

The project for the Milwaukee Metropolitan Sewerage District consists of approximately 2,100 ft and 2,400 ft of 17 ft horseshoe drill-and-blast tunnel, with two 20-ft drop shafts and one 30-ft riser shaft.

The shafts range from 250 to 300 ft deep with approximately 190 ft of overburden, which has to be frozen into the bedrock by contract. Also, a frozen cofferdamm of 80 ft by 250 ft for the various pipe connections is included.

The Jones Island shaft has been sunk to the tunnel invert. Both of the siphon drop shafts and the Scott Barclay Street shafts have been excavated to invert and the Erie Street has been excavated almost to invert. The AB and EH tunnels being excavated by drill-blast methods have been excavated 80 percent of their respective drives of 2,100 ft and 2,400 ft.

Personal: Martin (Dutch) Vliegenthart, Vice President; Carl Christensen, Project Manager; Bonnie Senkowski, Office Manager; Jerry Straube, Structure Superintendent; Darrell Vliegenthart, Shaft Superintendent. Information: (414) 258-2510.

Milwaukee
North 27th Street ISS extension
Shea/Kenny JV

Crews are currently performing preexcavation grouting of the shafts from the surface and drilling and placing freeze pipes around the circumference and starting freeze. Start of excavation is anticipated in November 2007.

Project Manager: Dan Martz; Project Engineer: Len Postregna; TBM Superintendent: Norm Hutchins; Master Mechanic: Keith Walters; Office Manager: Bonnie Senkowski; Safety: Randy Britton; VP Area Manager: Dutch Vliegenthart. Information: (414) 258-2510.

CANADA—BRITISH COLUMBIA
Brackendale
Ashlu Creek Hydro Project
Frontier-Kemper

The Ashlu Creek contract is a design-build-operate-transfer, run-of-the-river hydroelectric project. A 30-m long drill-blend starter tunnel was excavated under a subcontract by a local contractor.

A Wirth TBM was completely refurbished in the Evansville shops of Frontier-Kemper together with an entirely new backup system and delivered to the site and assembled in March 2007. Excavation commenced in May and is expected to be complete in the spring of 2008.

Personal: Serge Moalli, Project Manager; Roger Blankenship, General Superintendent; Jonathan Prenger, Project Engineer; Richard Olason, Business Manager. Information: Dave Rogstad, (812) 453-2741.

Vancouver
Seymour-Capilano Filtration Project
Bilfinger Berger

The first TBM, the “Seymour TBM,” commenced Phase 1 in the Raw Water Tunnel on June 1 and stopped after 136 m at station 0+196m from the Seymour Shaft for a scheduled stand down in late July to allow installation to commence of the second TBM, the “Capilano TBM,” in the Treated Water Tunnel.

Between March and August 2007 all gearboxes on both TBMs have needed to be removed, refurbished and replaced. Both machines are up and running now.

TBM #1 Raw Water Tunnel — The Raw Water Tunnel excavation has now reached 2,520 m with average daily advance rates between 14 and 24 m per day. Ground conditions have varied within the expected values.

TBM #2 Treated Water Tunnel — The Treated Water Tunnel has now advanced 2,350 m. Ground conditions have varied within the expected values.

Ground support includes extended distances of no bolting, interspersed with shorter areas of bolts and mesh and shorter areas of bolts mesh and shotcrete. Currently there are no steel sets installed in the tunnels.

Personal: GVRD — Tom Morrison, Senior Project Engineer Tunnels; Doug Neden, Manager Water Treatment Engineering; Goran Ojaca, Senior Engineer. PLA - Andy Saltis, Area Manager Tunnels; Jeff Sprastoon, PM for SCFP; Brian Gardner, Project Director & VP Project Services. HMM — Dean Brox, RE; Joe Rotzien, ARE. Geology — Golder (as sub to HMM), Grant Bonin. BBC — Christian Genschel, PM; Joseph Messner, CM. Information: (604) 982-3197.
ANNOUNCEMENT FOR WASHINGTON SUBURBAN SANITARY COMMISSION (WSSC) CONSTRUCTION OF THE BI-COUNTY WATER TUNNEL PROJECT MONTGOMERY COUNTY, MARYLAND

The Washington Suburban Sanitary Commission (WSSC) located in Laurel, Maryland, plans to release a solicitation in late 2007 or early 2008 for qualified tunneling contractors on the Bi-County Water Tunnel Project. The project will consist of approximately 5.3 miles of hard rock tunnel, 100 to 300 feet underground and lined with 84-inch diameter welded steel pipe. The tunnel is expected to be excavated by a tunnel boring machine (TBM) and the annular space between the tunnel and carrier pipe will be filled with grout.

In addition, this project will be advertised with a mandatory provision for Small Local Business Enterprise participation for approved small local businesses. We will also encourage 20 percent certified minority business participation. Please visit WSSC’s website for upcoming Outreach event regarding this project. For information on WSSC’s Small Local Business Enterprise Program, visit WSSC’s web site at www.wsscwater.com/Business/SLMBE.

If your firm is interested in participating in this project, please contact Acquisition at 301-206-8288 and request information on registering for this project. It should be noted that at this time there is no pre-qualification requirement for this project. Qualification requirements will be included in the contract documents.

Details on this project and projected schedule is available on the WSSC Web Page at www.wsscwater.com and click on the bi-county water tunnel logo.

WSSC is the 8th largest water and wastewater utility in the nation, serving nearly 1.8 million customers in Prince George’s and Montgomery counties. We operate and maintain seven water and wastewater plants, over 5,400 miles of fresh water pipelines and over 5,300 miles of sewer pipelines. In our 89-year history, our drinking water has always met or exceeded federal standards.

FOR CONTINUOUS UPDATES, PLEASE VISIT WSSC’s WEB SITE.

THIS IS NOT A REQUEST FOR PROPOSALS

Thomas Laboon
Acquisition Director

PROJECT MECHANICAL ENGINEER

A major underground equipment supplier is looking for a degreed mechanical engineer with two to three years mechanical design experience. This is growth opportunity to develop from mechanical design to project management and management. The company is a division of an international company with projects worldwide. This position would focus primarily on projects within the U.S. but may require some short term travel to Europe. Should be well acquainted with the latest release of AutoCAD and SolidWorks. Position is in the Pacific Northwest. References required. Contact tunneljobs@benjaminmedia.com. Reference Job #1007.
Monitoring

With the Leica GMX902 GG, Leica Geosystems continues its commitment to developing accurate and reliable GNSS monitoring solutions. The Leica GMX902 GG is a high-performance GPS + GLONASS receiver, specially developed to monitor sensitive structures such as bridges, mines or high rise buildings and crucial topographies such as land slides or volcanoes. It provides precise dual frequency code and phase data up to 20 Hz, enabling precise data capture as the basis for highly accurate position calculation and motion analysis.

As with the other receivers in the GMX900 family, the GMX902 GG has been designed and built purely for monitoring applications. The key characteristics of the GMX900 family are low power consumption, high quality measurement, simplicity and durability. The Leica GMX902 GG is an ideal receiver for deformation monitoring with superior tracking of satellites from the both GPS and GLONASS constellations. The GMX902 GG is also a perfect receiver for atmospheric studies and ionospheric scintillation research with 20Hz measurement of high precision dual-frequency code, phase and signal-to-noise ratio.

“Our development teams have taken our suggestions from years of monitoring applications all over the world and implemented those requests into the GMX902. This sensor has the same accuracy as the rest of the family of products, costs less, and uses half the power, which is exactly what the market needed.”

Gerard Manley, vice president Engineered Solutions, Leica Geosystems Inc., continues, “This allows us to deploy units in some of the world’s most demanding locations and confidently operate on battery and solar operation for many years. The GMX902 will change the way GPS monitoring is used by the engineering community.”

The Leica GMX902 GG integrates seamlessly with a suite of Leica Geosystems software for advanced data analysis and processing, data archiving, high speed and high accuracy displacement calculation, limit checks and messaging in combination with other sensor families.

Load Moment Indicators

Hirschmann Automation and Control has introduced the iVISOR mentor QVGA load moment indicator (LMI) for mobile cranes. The iVISOR mentor QVGA provides the operator with a graphic display of the crane and the current load and geometric information, including the actual and allowable load, boom length, boom angle, and load radius. The display also includes an integrated bar graph, which provides the operator with information on the cranes utilization. The graphic display has a resolution of 320 x 240 pixels and includes BestVIEW technology which automatically adjusts the contrast depending on the temperature and lighting conditions.

The systems central processing unit and operators console are integrated into one compact unit making for quick and easy installation. In addition to the freely programmable control functionality, two CANopen interfaces enable networking with other controls and displays. The LMI system can be used as a CANopen master or as a CANopen slave. It can also communicate with other CAN Bus capable devices via the CAN Bus interfaces which support the CANopen protocol and J1939.

The iVISOR mentor QVGA also provides the flexibility of optional Working Area Definition (WADS), event recorder, and the use of wireless sensors.

Construction Grout

Sakrete, North America’s original dry cement mix brand, has developed a Non-Shrink Construction Grout to add to their list of “just add water” products. The grout is non-metallic structural hydraulic cement, specially formulated for high-strength grouting. Sakrete’s Non-Shrink Construction Grout is used for grouting of concrete that has been poured, precast, tilted-up and prestressed. It is also used for grouting heavy machinery, sole plates, anchor bolts, steel bearing plates, reinforcing steel in block cells and dowel rods.

The non-shrink grout has three different consistencies to ensure easy usage in any project, and is pumpable for easy placement. It is noncorrosive and will not attack reinforcements used in applications. It meets the federal specifications ASTM C 1107 and CRD-C 021, while being super-plasticized for improved strength.

Sakrete was founded in 1936 and is the original dry cement mix brand in North America. The Sakrete brand is owned and managed by Oldcastle APG/Bonsal American, Inc. Bonsal American is headquartered in Charlotte, N.C. For more information on Sakrete, call 1-800-738-1621 or visit the company’s Web site at www.sakrete.com.
Events Calendar

October 2007

11-13 32nd Annual Conference on Deep Foundations, Washington, D.C.,
Deep Foundations Institute
Ph: (973) 423-4030; Fax: (973) 423-4031

16-19 ICUEE 2007, Louisville, Ky,
Ph: (800) 867-6060; Fax: (414) 272-2672;
E-mail: info@icuee.com; Web: www.icuee.com

25 Passive Fire Protection of Underground Concrete Structures,
New York City
Ph: (800) 763-3132; Fax: (303) 973-3845;
E-mail: meetings@smenet.org;
Web: www.smenet.org

November 2007

27-29 STUVA Conference '07, Cologne, Germany,
Ph: +49 (0) 21 59 79 50; Fax: +49 (0) 21 5 97 95-50
E-mail: info@stova.de;
Web: www.stuva.de

27-29 INTERtunnel 2007, Moscow, Russia,
Ph: +44 (0) 1273 300 434; Fax: +44 (0) 1273 300 986
E-mail: ken.harris@mackbrooks.co.uk;
Web: www.intertunnelrussia.com

16-19 ICUEE 2007, Louisville, Ky,
Ph: (800) 867-6060; Fax: (414) 272-2672;
E-mail: info@icuee.com;
Web: www.icuee.com

25 Passive Fire Protection of Underground Concrete Structures,
New York City
Ph: (800) 763-3132; Fax: (303) 973-3845;
E-mail: meetings@smenet.org;
Web: www.smenet.org

March 2008

11-15 CONEXPO-CON/AGG, Las Vegas,
Ph: (800) 867-6060;
Web: www.conexpoconagg.com

June 2008

7-11 2008 North American Tunneling, San Francisco
Ph: (800) 763-3132; Fax: (303) 973-3845;
E-mail: meetings@smenet.org;
Web: www.smenet.org

September 2008

22-27 ITA-AITES World Tunnel Congress 2008,
Delhi, India, ITA,
Ph: +91-11-2615984/26116567;
Fax: +91-11-26116347
E-mail: sunil@cbip.org;
Web: www.wtc2008.org

May 2009

23-28 World Tunnel Congress & 35th ITA General Assembly
“Safe tunnelling for the City and Environment,”
Budapest, Hungary
Ph: +36 1 214 7701; Fax: +36 1 201 2680;
E-mail: secretariat@wtc2009.org;
Web: www.wtc2009.org

June 2009

14-17 2009 RETC, Las Vegas
Ph: (800) 763-3132; Fax: (303) 973-3845;
E-mail: meetings@smenet.org;
Web: www.retc.org

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My Turn

Drastic Actions Needed to Attract New Talent to Tunneling

By Robert “Red” Robinson

Over the last decade, virtually all companies and organizations associated with the tunneling industry have experienced a scarcity of newly educated engineers interested in a profession in tunneling. It has become blatantly obvious to most of us that an insufficient number of students are either electing to go into engineering, or are completing their education in engineering. Consequently contractors, designers, suppliers and owners are all competing for the same few graduating engineers. This has become even more critical as 1) tunnel design and construction continue to involve more sophisticated technologies requiring a state-of-the-art education, and 2) much of our baby-boomer engineering work force approaches retirement age.

The tunneling industry as a whole is suffering from this lack of new blood. The aging of our industry is particularly noticeable when we get together at a major tunneling conference and the average age is in the 50s with only a smattering of younger attendees in their 20s and 30s. Consequently, we must as an industry, as companies and as individuals seek to remedy this scarcity of young engineers if we are to survive as a viable and competitive industry.

In part, the scarcity of entry level engineers stems from a decrease in the number of colleges and universities that teach various aspects of tunneling and mining. In just the last 20 years, the number of tunnel and mining oriented curriculums has decreased from more than 30 colleges and universities in the United States to fewer than a dozen schools with even a portion of their curriculum directed at tunneling processes and related ground behavior.

Maybe today’s students don’t consider tunneling to be as exciting or profitable as developing computer codes for the next Halo-like computer game. Or possibly the decrease in the number of tunneling related courses is due in part to a perception by school administrators that the tunneling industry has become a mature industry that is not in need of substantial numbers of new engineers. Possibly it is also because many of the professors that directed research and taught tunneling related courses are retiring. Or possibly it is because funding from federal agencies for projects and research is virtually non-existent compared to the relatively robust research funding that took place in the 1960s and ’70s. More than likely, the painful drop in the number of graduating engineers is due to a combination of these factors, as well as a few others.

Consequently we, as an industry, and as individuals need to reverse this debilitating downward trend in the number of new engineers entering our field. To attract students to engineering we need to spark their interest and the interest of their instructors in our profession, and we need to compete with other industries by providing some level of financial support for research, scholarships, awards, and summer internships.

Individually we can all provide information to beginning science and engineering students and their instructors via technical presentations in campus classes and symposia, and even filling part-time teaching positions. Engineering departments at most schools have lunch time or after school symposia or forums for presentations on underground projects, construction methods, construction management, etc. Many schools are cutting the size of their engineering departments and have limited budgets for replacing retiring professors. Consequently, many schools are open to proposals by individuals, professional societies, and companies to assist in teaching a class on particular technical subject.

In recognition of the dwindling numbers of new engineers entering our industry, the executive committee for the Rapid Excavation and Tunneling Conference (RETC) implemented an attendance scholarship fund in 2003. The scholarship was established to promote awareness in undergraduate college engineering students of the challenges and rewards that are available in tunneling. The scholarships are awarded on a competitive basis to undergraduate applicants to fully fund their travel and attendance expense for participating in an RETC.

The initial scholarship fund was sponsored by donations from members of the executive committee for the 2003 RETC held in New Orleans, a total of seven students applied and were accepted from several universities. Subsequently, the executive committee elected to increase the conference registration fee by $25 for each paid attendee to help perpetuate the scholarship fund for successive RETCs. By the 2007 RETC, there were 16 applicants from nine schools expressing an interest in attending the conference to learn more about tunneling. The executive committee accepted nine of the applicants for a fully paid conference attendance where they could network with other participants, marvel at the wide range of technologies presented in the exhibition hall, and develop a greater understanding of the opportunities and requirements for a rewarding career in tunneling. A side benefit of student scholarships has been that students have returned to their schools and enthusiastically encouraged their classmates to apply for RETC scholarships for the next RETC.

So, if we are to keep our tunneling industry growing, we all need to step up to the bar and provide whatever time and monetary assistance that we are capable of providing to the students passing through our university system. RETC and other groups have taken a step forward in recognizing the huge need for monetary support, and a few companies have sponsored scholarships at various universities. However, it will take a great deal more volunteer time and money to expand the number of graduating engineering students back to the levels of the 1960s and ’70s.

More company sponsored scholarships, research grants, summer internships, and even co-sponsored teaching positions are needed. And more time is needed from industry professionals to share their experience, “lessons learned” and enthusiasm with entry level though graduate level engineering students.

Robert “Red” Robinson is a Senior Vice President at Shannon & Wilson Inc., and is a member of the Executive Committee for the Rapid Excavation and Tunneling Conference.
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