

North American Tunnel Project Update



by Jack Burke

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.

Pacifica

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 crews 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) 290-5100.

San Bernardino

Arrowhead East and West Tunnels

Shea/Kenny JV

Arrowhead East Heading-Strawberry Portal — The Strawberry Tunnel excavation has advanced to more than (85 percent) of the drive with 19,100 lf mined to date, with approximately 3,300 lf left for completion of the mining.

Arrowhead West Heading-Waterman Canyon Portal — The Waterman Tunnel excava-

tion has advanced to more than 65 percent of the drive with 12,900 lf mined to date, with approximately 6,900 lf left to complete TBM mining.

Brian Fulcher, Project Director; Bob Gordon, Project Manager; Mike Belcher, PA; Stuart Lipofsky, Assistant Project Manager; Dana Downs, Project Engineer; Ron Walton, Superintendent-Strawberry; Bob Leslie, Superintendent-Waterman; Walkers — Danny Sayre, Don Fullmer, Jeff Bright, Bobbie Briggs, Ron Sammeth, Bradley Leonard, Jim Autry.

MWD: John Wallace, Construction Manager; Mike Bell, Resident Engineer; Ian Ward-McNally, Deputy Resident Engineer; Dan McMaster, Assistant Resident Engineer.

Information: Brian Fulcher — (909) 883-3399 or Brian.Fulcher@JFShea.com.

San Diego

San Vicente Pipeline

Traylor/Shea JV

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 lf.

Central Shaft Site/Reach 4 West: The CTS digger shield has advanced 12,000 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-Shea-Ghazi is complete.

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

Fountain Valley

Ellis Avenue Trunk Sewer

Barnard/Soletanche JV

The Orange County Sanitation District awarded the \$31 million contract to the joint venture team of Barnard Construction Company Inc. and Soletanche, 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 5,437-lf, 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

- * EPB 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. ID 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 Hurd, 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.

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 undulator tunnel under the next hillside. Mining operations have been completed for the undulator 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 TBMs.

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: Ray Hutton; Safety Manager: Barry Jackson, Survey Manager: Bill Currier, 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.

Hailey & Co.: Project Manager: Randy Wiek; 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 County 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 Coibion, Project Engineer; Leveius Byrant, Health & Safety Manager. Information: Rod Shoulders, (440) 248-0616.

ILLINOIS

Chicago

TARP Calumet Tunnel System
Kenny Construction Co.

The project involves the splitting of the two pump rooms at the existing Calumet TARP pump station, and the excavation of a 20 ft diameter valve shaft for access to a new valve isolation chamber where four 4 ft by 7 ft hydraulically operated bonneted gate valves, a canopy system, sump pumps, a ventilation system and a bridge crane will be installed for the separation. A stair and elevator system will be installed in the 320 ft deep shaft along with an access building at the surface after the chamber is completed. The existing wet well for the existing station will be divided by constructing a new dividing wall to full height of wet well shaft.

In addition to the valve chamber access shaft, there are two 10-ft diameter utility shafts to each of the two existing pump rooms, an additional vent shaft with another 19 ft diameter west pump room Access shaft. The new access shaft also includes a stairway and elevator with an access building at the surface. Each of the existing bifurcation legs will be isolated with stainless steel inlet and outlet flumes to/from the new isolation valves. The existing pump rooms will be re-configured and upgraded for larger capacity dewatering pumps. All of the shafts have been excavated and concreted.

Personnel: Ted Budd, Tunnel Division Manager; Mike Surman, Project Manager;

TBM ANIMATIONS

Since 1999, Shimahara Graphics has been helping construction professionals illustrate highly specialized ideas with clarity and impact. We specialize in TBM animations for public relations and dispute resolution.

Use the power of digital animation to tell your story!
For more information please call 310.450.9612

SHIMAHARA
Graphics
www.shimahara-graphics.com

Reader Service Number 12

North American Tunnel Project Update

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/Obayashi JV

This project for the U.S. Army Corps of Engineers started in 2006 has been remobilized 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 under way. Project completion is scheduled for June 2008.

M.V. Mergentime, Project Sponsor; Loc Spenser, Project Superintendent; Bogdan Velcu, 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 \$33,998,000. It consists of a fresh water collection tunnel, 8,000 lf and 12-ft in diameter, and one shaft, 230-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.

Key Subcontractors/Consultants: Lachel Felice & Associates, Bencor Foundation Specialist, Reynolds Inc., Collector Well Int. Inc.

Project Personnel: Gevan McCoy, Project Manager; Terry Lowe, Project Superintendent; Alesia Beck, Project Engineer. Information: Rod Shoulders, (440) 248-0616.

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) 941-1495.

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 lf and two are 5,200 lf. The tunnels start from the existing 63rd Street terminus. 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 lf 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-vf 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 was 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 Engineers: 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 Disley. Information: Don Hickey, (718) 321-1818

New York City

Water Tunnel No. 3, Stage 2, Contract 538C
Schivone/Frontier-Kemper/Shea JV

New York Water Tunnel No. 3 currently being constructed by Schivone/Shea/Frontier Kemper JV involves excavation of 27,178 lf of 12-ft, 6-in. tunnel, concrete lining of 45, 899 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 18,700 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 has been installed in Shafts 27B, 28B, 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 raise bored, while slashing and concrete placement operation are taking place at three shafts. Final contract completion is in July 2009.

Schiavone Project Manager: Anthony Del Vecovo; General Superintendent: Dale Estus; Project Engineer: Florentino Sison. J.F. Shea Shaft Manager: Shemek Oginski; Shaft Superintendent: Mike Jennings; Shaft Project Engineer: Jim Rosteck. 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. in diameter segmental lined tunnel. A Lovat EPB 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

KM&M&K JV

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

Project Manager: Robert J. Kassouf; Project Superintendent: Ralph Dodero. Information: Bob Kassouf, (216) 651-3333.

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 Awald, Project Superintendent. Information: (614) 491-9551.

Columbus

BWOAS 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 Bulla; Project Superintendent: John Herward. Information: (614) 491-2800, Fax: 614-491-2802.

Columbus

Big Walnut Sanitary Trunks Sewer Extension

Site work is under way at the five shaft sites. Shaft 4 (mining shaft) excavation is complete. Drilling and shooting at Shaft 3 is under way. Soft ground excavation at Shaft 2 is complete, with vertical boring machine excavation scheduled to begin soon. Soft ground excavation at Shaft 1 is under way. Tunnel mining operations are scheduled to begin in October 2007.

Project Manager: Robert J. Kassouf; Project Superintendent: Bill McFadden. Information: Bob Kassouf, (216) 651-3333

OREGON

Portland

East Side CSO

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 50 ft diameter and 130 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 Metzger. 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

JACOBS ASSOCIATES

engineering
solutions for
underground
projects

San Francisco
Boston
Las Vegas
Pasadena
Portland
San Diego
Seattle

www.jacobssf.com

Geologic profile shown of the San Vicente Pipeline, a San Diego County Water Authority project. **JA** served as the prime design consultant.

Reader Service Number 13

North American Tunnel Project Update

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 under way with the launch pit excavation scheduled to be completed in early October 2007. SR-65 underpinning work is also in progress. The Herrenknecht 23-ft diameter mixface 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.

Technopref 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 - drilled piers, soldier piles 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; Daisuke Sone, Mechanical Engineer; Russ Pollard, Chief Field Engineer; Mike Restani, Safety Supervisor; Randy Marnhout, General Superintendent; William Gyofi, Site Superintendent; Vince Kraynak, Utility Superintendent; Joe Restelli, Electrical Superintendent.

TEXAS

Round Rock

Round Rock Interceptor

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 Hobas 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.

Subcontractors and Consultants: Lachel Felice & Associates, Pacific International Grout Company, Benitez Construction Company.

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

VIRGINIA

Richmond

Battery Park Emergency Trunk Sewer Replacement Sewer Project

Bradshaw 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 ribs 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-in. FRRP main line, 200 lf of 60-in. jacked RCP, 1,000 lf of 48-in. jacked RCP, 400 lf of open cut 48-in. RCP, and 500 lf 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.

Area Project Manager: Mark Rybak; General Superintendent: Frank Jones; General Superintendent: Bob Welch; Jacked and Open Cut TCP Superintendent: Jack Jones; Tunnel Superintendents: Ray Grossman, Frank Lynch; Project Engineer: Todd Brown; Field Engineer: Matt Exley; TBM Operators: John Kirk, Steve Malm. Information: Mark Rybak, (410) 977-0955.

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 relaunch 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 concrete.

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. Plinth operations and rail works on the aerial structure is 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 Clucas, Structural Manager; Gregg Olsen, Project Engineer; Billy Hahn, Safety Manager; Leif Nordell, Tunnel Concrete Superintendent; Duke Wilhite, Surface Superintendent; Satoshi Akai, SEM Engineer; Yoshi Sawamoto, Equipment Manager; Tomo Kudo, EPB Tunnel Engineer; Mat Matsumoto Structural/Building Engineer; Brent Buzzard, Estimator. Information: Jon Kirk (206) 262-0665.

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 micro-tunnel 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 Sarlitto, Safety Manager; Safety; Austin Cooney, Home Office Sponsor. Information: (847) 541-8200 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 Giandrone 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

Perfect Connections.

InnoTrans **InnoTrans 2008**
 International Trade Fair
 for Transport Technology
 Innovative Components · Vehicles · Systems
 23 - 26 September, Berlin
 www.innotrans.com

Reader Service Number 14

North American Tunnel Project Update

utilize two Herrenknecht 17.38 ft mixshield machines. The project also includes 3,400 lf 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 Rescamps; General Superintendent: Francois DeLille; Tunnel Superintendent: Jim Nickerson; Equipment Superintendent: Greg Cook; Electrical Superintendent: John Issacs; Business Manager: Cheryl Sturdefant. 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 lf of 15-ft and 20-ft wide by 27-ft-tall tunnels. The excavation is located in shale 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 566-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 García. Information: (304) 453-7030.

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. Dredging 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 shooting 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 land-based tunnel 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.

Personnel: Ted Budd, Tunnel Division Manager; Paul McDermott, Project Manager; Jon Isaacson, Project Engineer; Tom Plinke, QA/QC Manager; Mike Smithson, D/B Coordinator; Mark Saylor, Equipment Manager; Joe Johnson, Electrical Superintendent; Tom Peterson, TBM Specialist; 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 TedBudd@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 cofferdam 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.

Personnel: Martin (Dutch) Vliegthart, Vice President; Carl Christensen, Project Manager; Bonnie Senkowski, Office Manager; Jerry Straube, Structure Superintendent; Darrell Vliegthart, 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 Vliegthart. 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-blast 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.

Personnel: Serge Moalli, Project Manager; Roger Blankenship, General Superintendent; Jonathan Prenger, Project Engineer; Richard Olason, Business Manager. Information: Dave Rogstad, (812) 426-2741.

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.

Personnel: GVRD — Tom Morrison, Senior Project Engineer Tunnels; Doug Neden, Manager Water Treatment Engineering; Goran Oljaca, Senior Engineer. PLA - Andy Saltis, Area Manager Tunnels; Jeff Spruston, 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.