

THE MAGAZINE FOR THE PEOPLE
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CONSTRUCTION

TODAY

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Well-Oiled

NORTH AMERICAN CONSTRUCTION GROUP → p.110

SILVER LINING:
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Vegas Tunnel Constructors

www.sahealy.com

- *Budget: \$450 million*
- *Location: Las Vegas*
- *Employees at peak: 250*
- *Scope: Three-mile tunnel leading to a new freshwater intake structure*

"We've done a lot of complicated tunnels, but nothing quite like this."

-Jim McDonald, vice president of operations

Beneath the SURFACE

THERE IS NOTHING BORING ABOUT THE TUNNEL-BORING PROJECT THAT VEGAS TUNNEL CONSTRUCTORS IS WORKING ON 600 FEET BENEATH NEVADA'S LAKE MEAD. BY KATHRYN JONES

With more than 75 years of industry experience, S.A. Healy Co. has established a reputation as the go-to contractor for complex tunnel projects, including those mined through mountains, under busy highways and urban high-rises or, most recently, 600 feet below the surface of Nevada's Lake Mead.

Founder Stephen Healy built the Lombard, Ill.-based company into a diversified general contractor with expertise in bridges, dams, sewers and water treatment plants. However, it specializes in underground construction projects such as shafts, pipelines and below-grade structures. In 1982, Impregilo, a civil contractor based in Milan, Italy, purchased the business. Since then, most of Impregilo's U.S. work has been constructed by S.A. Healy.

Recently, the two companies partnered in a joint venture known as Vegas Tunnel Constructors to design/build the \$450 million Lake Mead Intake No. 3 Project outside of Las Vegas. Work includes drilling a shaft 600 feet deep, driving a tunnel three miles under Lake Mead and constructing a new freshwater intake structure at the end of the tunnel, which also will be under the lake. Construction began in March 2008 and is expected to conclude in January 2013.

Nothing Like It

The breadth of work associated with the Lake Mead Intake No. 3 Project mystifies even the most experienced industry veterans, including Jim McDonald, vice president of operations at S.A. Healy. "We've done a lot of complicated tunnels," he admits, "but nothing quite like this." S.A. Healy has dug shafts through nearly impenetrable rock, driven tunnels underwater and built intake structures in the past, he says, "we just haven't done these things in this particular combination."

Right now, Vegas Tunnel Constructors is digging the 600-foot-deep shaft through a combination of drilling and blasting. Its tunnel-boring machine (TBM), manufactured by Herrenknecht, recently arrived from Germany and is in the preliminary stages of assembly. "We are using a very special tunnel-boring machine for this tunnel," McDonald adds. "It is a hybrid TBM designed to operate at the highest water pressure ever."

After the shaft and starter tunnel are completed, crews will install the TBM and start mechanically excavating the three-mile tunnel, which McDonald anticipates will take 22 to 24 months. The pipeline will be concrete and 20 feet in diameter. "As the tunnel boring occurs, the concrete will come right behind it in precast pieces," he explains. "There are six pieces that make a ring, and each piece is six feet long. As the TBM continues to excavate, we will erect another section of pipeline."

The majority of the tunnel drive will be located in the Muddy Creek formation, which consists of late Tertiary sedimentary and volcanic bedrock. As the TBM approaches the area in which the intake structure will be built, it will pass through about 370 meters of red sandstone and about 90 meters of Callville Mesa basalt. "The red sandstone is going to be a challenge, and the basalt is going to be very wet, so that's a double challenge," McDonald notes. "Other than that, the Muddy Creek formation will be relatively easy."

Having a Blast

Perhaps the most unique aspect to the project is the freshwater intake structure, McDonald says, which will be about 300 feet underwater. For the excavation, "We're using some special blasting techniques that are very rare," he says. "I don't know if anybody does it [in construction]—certainly not 300 feet deep."

Vegas Tunnel Constructors will be performing a shaped charge, an

The project will include an intake structure constructed 300 feet below the water.

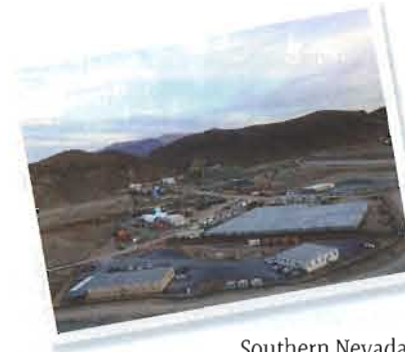


» Vegas Tunnel Constructors is digging a 600-foot shaft and will use a specialized Herrenknecht tunnel-boring machine designed to operate in high water pressure to drive the three-mile tunnel. The intake structure will be constructed on a barge at the shoreline and then lowered into a hole created by the use of explosives.

explosive charge shaped to focus the effect of the explosive's energy. The process is more commonly used to cut and form metal or initiate nuclear weapons. "The difficulty is that it's 300 feet deep underwater, and we're trying to do it without divers," he explains.

A crane situated on a barge will lower a frame into the water with the explosives attached to it. Crews will then set the explosives, pull the frame out and begin detonation. The structure itself is being constructed on a barge at the shoreline and will be floated into position on the lake and then lowered into the excavated hole. About 7,000 cubic yards of concrete will be pumped into the hole to anchor the structure into place.

Coincidentally, the only place Vegas Tunnel Constructors might use divers is within the tunnel-boring machine. "It's a very unique machine," McDonald emphasizes. "We pressurize the entire face of the machine - the cutter head - and this means you have to change the tools and inspect it under compressed air pressure. So, even though they're not going to be in the water, the divers will have the same oxygen equipment."



To survey its progress, Vegas Tunnel Constructors will utilize a remote-operated vehicle capable of shooting video underwater.

Nothing Like It

According to a March 2008 *Engineering News-Record* article written by Tony Illia, the Lake Mead Intake No. 3 Project is one of several water-related construction projects that the

Southern Nevada Water Authority will undertake in an effort to fight a drought that has lowered the water levels of Lake Mead more than 100 feet in the past decade. This is more than half of the lake's capacity, *Engineering News-Record* reported.

Created in the 1930s through the damming of the Colorado River, Lake Mead is one of the largest reservoirs in the world and the main source of water for the Las Vegas Valley. According to reports issued by NASA's Earth Observatory, which monitors the receding water levels of Lake Mead through its Earth-observation satellites, fluctuations in water levels are typical for lakes, but the dry spell in the Southwest will need to end soon for Lake Mead to return to its historically normal elevation. Officials are unsure of how long this could take. ♦

'The challenge is that it's 300 feet deep, and we're trying to do it without divers.'

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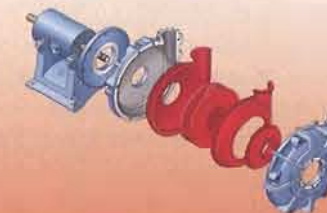
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