

Microtunneling on Maui



Hawaii Goes Underground to Rebuild Underground Infrastructure

By Philip R. Snyder

Forget about hula skirts, trade winds, surfing and Aloha hospitality. This is all about the infrastructure that enables our 50th state to serve its residents and tourists.

Hawaii is celebrating the Big Five-0 in 2009 and “HOBAS Pipe is celebrating 12 years of providing its unique centrifugally cast, fiberglass reinforced, polymer mortar (CCFRPM) pipe for infrastructure projects,” stated Bijan Khamanian, HOBAS Division Manager, West. The City and County of Honolulu’s Department of Environmental Services will be working on seven major sewer projects in June such as the Wanaao Road/Keolu Drive Reconstruction Sewer, which involves the installation of a gravity sewer line. More than 1 mile of the project will use 36-in. diameter CCFRPM jacking pipe.

Khamanian, speaking in April 2009, explained, “HOBAS CCFRPM pipes are very well accepted in both Honolulu and Maui counties. Currently we are supplying 4,400 lf of 36-in. jacking pipe to the Wanaao Road sewer, which connects to the Kalaheo project already in place. In Maui, 24-in. HOBAS PN150 pipes were used in the construction of Wailuku force main, which was completed in February 2009. As a follow up, Maui County is also using 42-in. HOBAS in the construction of the Wailuku Waster Water Pump Station as well.

“The largest HOBAS pipe specified in projects in Hawaii is approximately 5,800 lf of 72-in. Beachwalk WWPS and Force Main project in Waikiki, which will go into construction in the fourth quarter of 2009. In addition, projects in Pearl City and Ewa Beach will follow later in 2009 and early 2010.”

The Wanaao Road Sewer is being installed by Frank Coluccio Construction.

Kalaheo Avenue Sewer

One of the projects of special interest is the Kalaheo Avenue Sewer in Honolulu, for which HOBAS supplied 48-in. jacking

pipe to two separate contactors involved in the installation.

When workers broke ground on the final stage of Phase 1, Mayor Mufi Hannemann was on hand. The project included Kalaheo sewer reconstruction emergency work and a water line replacement project. The Kalaheo sewer serves most of the makai (seaward) areas of Honolulu. Cost of the contract was \$30.8 million.

Mayor Hannemann said, “I stated in my State of the City speech in February that these types of projects are essential parts of my administration’s effort to get our wastewater system up to par and to protect the environment.”

At the request of the community and the City, the installation contractor established a website to inform the public about the project, which involved a variety of trenchless methods. Aspects included rehabilitating 1,863 ft of an existing 54-in. gravity flow sewer main and six manholes along Kalaheo Avenue from Mokapu Boulevard to Kanui Drive and using microtunneling to install 5,305 ft of new 48-in. diameter sewer pipe along Kalaheo Avenue from Dune Circle to Kailua Road.

Beachwalk Microtunneling Project

The Beachwalk Microtunneling Project was another installation involving HOBAS. A portion of it involved a 1,180-ft river crossing underneath both the Ala Wai Canal and Kaiolu Street with two parallel 46-in. steel casings at a depth of 40 ft.

Work was launched following a devastating break in an aging sewer line under Kaiolu Street. This old line was replaced by the two new lines that connect to an existing pipe on the bottom of the canal. This allowed contractors to dismantle and remove the aboveground pipes and pumps along the Ala Wai Boulevard.

A microtunnel boring machine (MTBM) was used to install the primary casing. Workers used hydraulic jacks to push 20-

ft casings underground. The jacks are capable of applying up to 400 tons of pressure. With the steel casings in place, they inserted 2,540 ft of 36-in. HOBAS pipe.

The end result was the installation of two sets of wastewater pipelines that are key parts of the Beachwalk Wastewater Emergency Bypass (BWEB) project.

Once the pipe was slipped into the host casing, the lines were then connected to the Beachwalk Pump Station where it serves as part of the active force main pipeline conduit. The project was completed with grouting and testing.

The project team faced several initial challenges that they had to resolve almost immediately. This included the technical considerations of microtunneling, shaft construction methods, exact locations, sizes and depths, groundwater control and locating the existing underground utilities along the proposed route.

The project originally called for temporary lines under Kaiolu Street, but was changed to make those lines part of the permanent fix to upgrade the city's sewer system. Also, original plans called for one microtunneled line, but that was changed to two lines, giving the city an emergency backup in the event one line goes down. It will also allow greater flexibility for needed maintenance.

Honolulu Force Main Microtunneled

Another upgrade to Hawaii's sewer system was completed in Honolulu on the Hart Street WWPS Force Main Replacement. The new line included 2,200 ft of 48-in., 435-ton HOBAS pressure jacking pipes and more than a dozen custom designed fittings.

The original Hart Street force main, a 50-year-old steel line, served about one-third of the Honolulu area population. Several breaks made replacement a priority, but the job was not simple. The alignment crosses under the Honolulu harbor, the area's busiest port, docks and a major coastal highway. Facing these challenges, an all-trenchless installation was planned. First, twin 36-in. HDPE pipes were placed under the harbor using directional drilling; each line was 3,200 ft. Then, so grade could be controlled, the 48-in. HOBAS pipes were microtunneled under the port docks and the highway to reach the main interceptor.

Project designers, Wilson Okamoto & Associates of Honolulu, specified only two products for the microtunneled pipes, concrete steel cylinder and CCFRPM. The choice was limited because of the severity of the application and installation. First, the pipes had to be both strong enough for jacking and capable of pressure service. Second, considering the seawater external environment and raw sanitary sewer flows inside, corrosion resistance was also important. Finally, reliability was paramount because of the difficulty of future access, depths up to 35 ft and the critical nature of this application.

General contractor, Modern Continental of Boston, Mass., chose HOBAS pipes as the most economical and reliable option.

The microtunneling was completed in four drives, two long and two short. The HOBAS pipes performed flawlessly with no breaks and maximum loads of only 200 tons even on the 1,000-ft push. One interjack station was inserted on each of the long drives, but neither was ever activated. Modern attributed the low loads to the mostly coral soils and the true OD dimensions of the HOBAS pipes. To minimize changeovers, 19-ft sections were utilized and two-inch stainless steel bushings were provided for lubrication-grout ports.

HOBAS fabricated a variety of fiberglass reinforced polymer (FRP) fittings to match the required alignment. A bifurcation, reducers and several elbows were used to transition from the two 36-in. HDPE lines to the single 48-in. HOBAS portion. Flanges and a wye permitted assembly to two valves and a lateral. Accurate detailing and fabrication of the various fittings facilitated an easy, precision "fit-up" in these complex areas. Modern used dresser style couplings as closure joints and for the connections of HOBAS to the HDPE pipes.



HOBAS pipe is well accepted in Hawaii and is being used for several microtunneling projects in both Honolulu and Maui counties.

The completed system easily passed the installed 100-psi field hydrotest with no leaks or breaks in any of the pipes or gasket-sealed joints. The project proceeded so trouble-free that it was completed four months ahead of schedule and under budget. With an aging sewer infrastructure, Honolulu has planned more applications for HOBAS pipes including sliplining rehabilitation and microtunneling installations.

Richard Harada of Wilson Okamoto Corporation of Honolulu explained, "Corrosion was a concern for the Hart Street WWPS Force Main Replacement project. This was a major pipeline going to the treatment plant and we wanted a pipe that could withstand the corrosive environment and provide a long service life. HOBAS was put in the specifications as an allowable pipe material that would provide extended service life yet was cost competitive with the other pipe material specified."

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