




# Pipeline



## Rebuilding America

### CONTENTS

- 3 | Product Profile**  
Hobas Pressure Pipes -  
ASTM Proven for Long Life
- 4 | Taking Lubbock by Storm**  
A Texas city uses HOBAS  
to decrease flooding
- 5 | Expanded Product Line**  
A new 110 inch diameter  
pipe is available
- 6 | Leave it to Beaverton**  
A utility on the Oregon  
coast protects wetlands  
with HOBAS pipe
- 8 | Golf Outings**  
HOBAS sponsors two  
area utility contractor  
associations

 The Pentagon, headquarters of the Department of Defense, is one of the world's largest office buildings. It has three times the floor space of the Empire State Building in New York City, houses over 23,000 employees and has over 17.5 miles of corridors. Regrettably, after over half a century, the Pentagon has never had a major renovation.

While the systems above ground are being improved, so are the systems below ground. In the midst of these renovations you can find HOBAS jacking pipes that were chosen as part of a recent design-build venture. On the new H&RP Condenser Intake/Outfall Project, HOBAS pipe replaced the 58-year-old, deteriorated underground pipe that supplied cooling water to the Pentagon for heating and refrigeration.

### Best Fit

HOBAS was proposed by Modern Continental Construction Company, Inc. of Cambridge, Massachusetts, the general contractor, due to its size. The nominal 90 inch diameter HOBAS pipe had a much smaller OD than a concrete pipe of the same nominal diameter. The 1,100 ton HOBAS jacking pipe had an outside diameter of 94 1/4 inches while maintaining an inside diameter of 88 3/4 inches. A similar concrete jacking pipe would need a wall thickness of roughly nine inches. This wall thickness, nearly three times that of HOBAS, would also increase the pipes weight per foot by 50 percent.

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REBUILDING AMERICA continued from page 1



HOBAS PIPES WERE LIGHTER THAN THE CONCRETE ALTERNATIVE.

**Lower Loads**

Aside from the OD providing a perfect match to some of their existing jacking equipment, Philippe Hewes with Modern Continental stated the "smooth OD creates less friction lowering jacking forces." The actual jacking forces on the project did not exceed 500 U.S. tons and were usually in the 300 ton range. Phil also noted that the smooth ID of the pipe provides excellent hydraulics. This benefit was also recognized by Arlington, VA office of Jacobs/Sverdrup that provided engineering direction for the design build project.

**Repaired in Place**

Any jacking contractor knows jacking is risky business. As with any jacking project, obstacles are present and this project was no exception. Site conditions forced excessive steering that unfortunately resulted in severe angles between some joints and point loads. Nonetheless, the resilient HOBAS pipe

material and the contractor's skill allowed for the jacking run to be completed. At over 50 feet of depth the most economical method of repair was in-place. HOBAS field service crews were dispatched and after a successful repair of the single damaged location, the pipe is again structurally sound.

**Best Value**

A highly competitive, best-value source selection determined the design build team. Their innovative design, including HOBAS pipe, saved the government money. This phase of the project has remained on schedule and within budget. The HOBAS line is completely installed and waiting on the completion of some other facilities before it will become operational in October. More information on the project may be found at the website dedicated to the Pentagon renovations: <http://renovation.pentagon.mil/projects-IO.htm>.

SMOOTH NON POROUS OD OF THE HOBAS PIPE CREATES LESS FRICTION.



## PRODUCT PROFILE

# HOBAS Pressure Pipes - ASTM Test Proven for Long-Life

### Introduction

▶ HOBAS centrifugal cast fiberglass reinforced polymer mortar (CCFRPM) pressure pipes have been tested according to and in compliance with ASTM and AWWA standards to determine their long-term pressure resistance. This permits safe design of the pipes in pressure applications per AWWA Manual M45 procedures. Using the safety margins specified (M45), the average HOBAS CCFRPM pressure pipe life is in excess of a thousand years!!

### Background

When pipes of any material are pressurized, a slight growth in diameter is experienced resulting in a ring tensile strain (stretch). The magnitude of the ring tensile strain depends on the pressure level, the diameter to wall thickness ratio and the ring tensile modulus of the pipe wall material. For plastic pipes including PVC, HDPE and HOBAS CCFRPM, the ring tensile strain developed is also a function of time, based on the creep characteristics of the material. To operate safely, the long-term ring tensile strain must not exceed the capabilities of the pipe wall material. The long-term behavior and capabilities are determined by extended pressure tests of several pipe specimens.

### Capabilities Determination

The test protocols to measure and analyze the pipes' behavior under pressure are ASTM D1598 and D2992. The procedures require a minimum of 18 pipes to be pressurized until failure. The pressures

must be chosen so pipe failures occur over a specified range of time, including at least one test that fails at or beyond 10,000 hours (~14 months). Generally, higher initial wall strains (stress) result in shorter failure times, while pipes with lower strains have longer failure times. Per the ASTM method, the data (initial strain vs. time to failure) is analyzed by covariant log-log linear least squares regression and extrapolated to 50 years to determine average the initial strain (stress) level (hydrostatic design basis - HDB) that causes pipe failure in 50 years.

### Pipe Design

Per AWWA M45 procedures and the ASTM & AWWA fiberglass pressure pipe product standards' requirements, the maximum allowable initial ring tensile strain due to operating pressure in the piping system cannot exceed the HDB (50 year capability) reduced by a 1.8 safety factor. Therefore, for each application, the pipe must be designed (wall strength and thickness) to limit the initial strain caused by system operating pressure to be equal to or less than the HDB strain / 1.8.

### HOBAS Pipe Testing and Results

Per the test method requirements, a total of 18 HOBAS Pipe USA pressure pipes, produced in our Houston factory, were tested under hydrostatic pressure, at our facility, until failure occurred. These tests were witnessed and periodically inspected by Southwestern Laboratories of Houston (acting as an independent auditor). The test data was analyzed per ASTM D2992 requirements to develop the regression equation to characterize

the pipes' long-term behavior under pressure. The resulting projected 50 year HDB strain is 0.62234%. The maximum allowable initial ring tensile strain for HOBAS CCFRPM pressure pipes due the operating pressure is  $0.63334\% / 1.8 = 0.346\%$ .

### Conclusion & Benefits

Based on the ASTM long-term pressure testing results, HOBAS CCFRPM pressure pipes, operating with an initial ring tensile strain of ~0.346%, will have an expected average service life of several thousand years!! At lower strain levels, the projected life will be even longer!!

HOBAS Pipe USA has delivered ~500,000' of pressure pipes in the USA for sewer mains, water supply and other applications. Worldwide, over 2000 miles of HOBAS CCFRPM pipes are performing trouble-free in pressure service, some for over 40 years!! Specify HOBAS CCFRPM pressure pipes with confidence knowing that they are test proven and service tested for long life. ●

# Taking Lubbock by Storm

▶ Heavy rains have plagued the City of Lubbock in years past. In order to relieve some of the flooding the South Central Drainage System Project was developed. Parkhill Smith & Cooper, Inc. (PSC) of Lubbock, Texas designed the system that is expected to decrease the volume and duration of flood water on city streets. The storm water system directs overflow from 11 playa lakes to a discharge point near the city's water reclamation plant close to the Slaton Highway.

NATIONAL WEATHER SERVICE LUBBOCK TX  
 603 AM CDT THU JUN 26 2003

THE NATIONAL WEATHER SERVICE HAS ISSUED AN URBAN AND SMALL STREAM FLOOD ADVISORY FOR...LUBBOCK COUNTY IN NORTHWEST TEXAS UNTIL 800 AM CDT

EXCESSIVE RUNOFF FROM THIS STORM WILL CAUSE FLASH FLOODING OF SMALL CREEKS AND STREAMS...HIGHWAYS AND UNDERPASSES. STREET FLOODING WILL BE WIDESPREAD.



SPOIL WAS REMOVED FROM THE TUNNEL VIA MAN RIDDEN CARS, AND A RAIL SYSTEM ON THE INTERIOR OF THE HOBAS PIPES.

## HOBAS Chosen

General contractor, Barnard Construction Company, Inc. of Bozeman, Montana used HOBAS previously on a sliplining rehabilitation project along Sloan lane in Las Vegas. Southland Contracting, Inc., of Fort Worth, Texas, the installation sub-contractor, has over 10 years of installation history using HOBAS pipes in many types of installations including microtunneling. Consequently, they were confident in the performance of the product.

The specifications included HOBAS and standard RCP for the direct bury and tunnel portions of the project. They also included solid wall and profile wall polyethylene and corrugated metal pipe alternatives for the direct bury portions. When the bids were tallied, the alternative materials did not represent a substantial cost savings on the project and were thrown out.

## Performance Confidence

"The HOBAS installation was just beautiful," stated Dave Taylor of Southland. "We could do things with HOBAS that we couldn't have done with other products." As an installer, Dave prefers the CCFRPM pipe due to its versatility and ease of installation. "We installed the pipe sec-

Continued on page 5

TAKING LUBBOCK BY STORM continued from page 4

tions around three big tunneled curves and directly under the railroad. We also quickly repaired a piece of pipe that was damaged on site. When HOBAS was finished, you couldn't even tell it was repaired" stated Dave. When asked about the HOBAS product "I just think it is the greatest. Everyone from sales to customer service and field service was top notch. And they were there when we needed them".

### Ahead of Schedule

The construction, which began in July 2001, was completed nine months ahead of schedule. The \$36 million system was projected to be finished in April of 2004. In late June 2003 the first inlets were opened and the new storm sewer

became functional. Additional inlets were later opened and the entire system is now operational. The project included more than 10,000 feet of HOBAS CCFRPM pipes ranging from 24-inch to 72-inch diameter at depth of over 50 feet. The majority of the HOBAS was installed by tunneling methods, either by itself or within a primary liner.

### "Above Specification"

The specifications required HOBAS pipes to meet ASTM D3262 with minimum stiffness classes of 36, 46 and 72 psi depending on the depth of cover and the installation means. PSC inspected the pipe production and testing at the manufacturing plant in Houston. Robert Torres, EIT, inspector for PSC, found that the "pipe performed at or above specification levels in all cases." Nearing the end of the project we heard from Robert again "with the system now operational, all we need now is some rain to see how well it will work." ●



THE HOBAS PIPE WAS INSTALLED DIRECTLY WITHIN THE ROCK TUNNEL AT DEPTHS OF UP TO 50 FEET.

## Expanded Product line



▶ HOBAS has again expanded the product line to meet the needs of our customers. The latest addition to the diameter range, includes a 110 inch nominal diameter pipe. Pipes for direct bury, sliplining, jacking and other applications are now available in this diameter. ●

# Leave it to Beaverton

▶ Situated in the heart of the Tualatin Valley, midway between majestic Mt. Hood and the spectacular Oregon coast, Beaverton is a city that devotes 1,000 acres to 100 parks so one is within a half mile of every home. With this emphasis on green space, Clean Water Services, the regional wastewater and stormwater utility, set the highest priority on reliability in planning a sewer upgrade through Tualatin Hills Park and Recreation District's 219-acre Nature Park. Following the Beaverton Creek stream corridor, the new sewer line would replace the old one that was too deteriorated to repair.



THE ALL FIBERGLASS SYSTEM IS CORROSION RESISTANT AND WATER TIGHT.

According to Steve Lampert, one of Clean Water Services' project managers, "The main consideration was we didn't want to have to go back out to the wetlands to make repairs." A corrosion resistant product that would remain leak-free for years to come was exactly what they were looking for.

### Corrosion Resistant

The specifications included 8,000 feet of pipe - 2,100 feet of 48-inch, 3,700 feet of 60-inch and 2,200 feet of 66-inch. The alternatives were profile wall polyethylene and centrifugally cast, fiberglass-reinforced, polymer mortar (HOBAS CCFRPM) pipe. Neither of these is affected by hydrogen sulfide as unlined concrete pipe would be.

### High Stiffness Design

The contractor, John L. Jersey & Son, Inc. of Portland, bid the job with HOBAS CCFRPM pipes. John F. Kalkhoven, P.E., Jersey project manager, said that strength and durability were two of the important reasons his firm chose HOBAS. He explained that the profile wall polyethylene was not as stiff as the HOBAS product and it would require additional care to insure a quality installation. He explained, "The polyethylene pipe would have required a filter cloth liner for the excavation and complete coverage with bedding rock". The HOBAS trench details did not require filter fabric and needed bedding only up to the springline. "Jersey and Son told Clean Water Services' staff during an interview that HOBAS Pipe would cost less than the profile wall option to install and would make installation easier," Lampert added, "The biggest benefit of HOBAS pipe is



THE HOBAS RISERS WERE SIMPLY ATTACHED WITH AN FWC COUPLING.

constructability. It is strong and provides ease of construction."

### All Fiberglass System

In order to accommodate the many changes on the sewer line as it followed the meandering creek, Jersey installed manholes. It wasn't uncommon to have a series of manhole runs of only: 100 feet, 70 feet, 130 feet then 500 feet. "The custom-made manholes simplified this task," Kalkhoven said. HOBAS manufactured each manhole with the correct miter and FWC couplings so that they were easily joined. "For the first 2,000 feet of pipe, we were limited to an easement 30 feet

Continued on page 7

LEAVE IT TO BEAVERTON continued from page 6

wide,” explained Kalkhoven. “Since the excavation for the 66-inch pipe was eight feet wide, we had an eleven foot path to bring everything in. All the pipe and bedding had to come from behind but this was no problem. We’d lay the pipe, then install the tee-base manhole and proceed to the next joint. After the manhole bases were installed, we put the risers in place and added the cover. The risers were delivered complete including fiberglass ladders.”

The 48-inch diameter manhole risers were reduced to a standard 24-inch top. HOBAS also made the manhole covers, which were attached with a gasket and bolts ensuring they would be watertight as the summer water levels rise. “HOBAS supplied a complete package,” Lampert continued. By providing the pipe, manhole tee bases, risers and lids, HOBAS makes jobs convenient for the contractor.

### Total Installed Cost

Lampert said that despite the actual cost of HOBAS pipes being higher, it was the less expensive option on a total installed cost basis. According to Jersey and Son, the cost of the cloth liner, extra bedding and additional labor for a more difficult installation clinched the decision. “The

numbers stood on their own based on my view,” said Lampert. “Also, it would provide an end product that Clean Water Services could be comfortable with.”

### Look to the Future

Both Lampert and Kalkhoven visited the HOBAS plant and were impressed by the quality process, so, even though they had never used it before, Jersey based their bid on HOBAS pipe. “The quality control is just phenomenal,” Lampert exclaimed. “The computer controlled systems and state-of-the-art manufacturing process assures that the pipe is of consistent high quality.”

“It is a good application,” Lampert said, “and I think that more municipalities and districts that do this sort of work are going to be looking at this kind of a design situation. HOBAS pipe really excels in large diameters and is a good option when future repairs would be difficult to make.”



“THE BIGGEST BENEFIT OF HOBAS IS CONSTRUCTABILITY” STATED STEVE LAMPERT, PE OF CWS.

“We want something that will be watertight,” Lampert added. “This installation will probably last 100 years. It will outlive me - I know that. I don’t expect to have to go back in there and fix anything for a long, long time.” ●



CUSTOM MITERED ELBOWS WERE MANUFACTURED TO FOLLOW THE MEANDERING STREAM.



LIGHTWEIGHT GASKET SEALED HOBAS PIPES WERE EASILY HANDLED IN THE NARROW PATHWAY.



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# West Coast Swing

## NUCA - Portland, Oregon

On 8/23/02, HOBAS sponsored hole number 7 (the lucky hole) at the Portland, Oregon chapter of NUCA's annual golf outing. HOBAS was supplying the pipe and fittings for the nearby Beaverton Interceptor Project and put one on display for attendees.

Many thanks to John L. Jersey Construction who was gracious enough to bring this T-base and riser from their jobsite. Their efforts contributed to the success of the display.

## UCAW - Kent, Washington

HOBAS cosponsored the Utility Contractors Association of Washington (UCAW) "Last Ditch Gold" tournament on Friday, August 8, 2003.



The winning team, shooting 59, comprised of Bill Reilly, Jr. (HOBAS rep in Oregon and Washington - far left) and Rick Rody (president of EJ Rody & Sons Construction - far right).