



# THE HOBAS PIPELINE

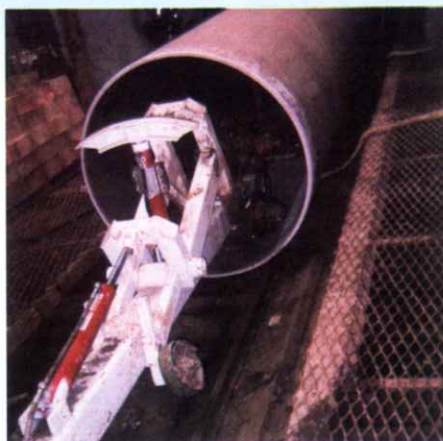
A PUBLICATION HIGHLIGHTING THE TECHNICAL AND PRACTICAL USES OF HOBAS PIPE

**HOBAS Pipe USA, Inc.**

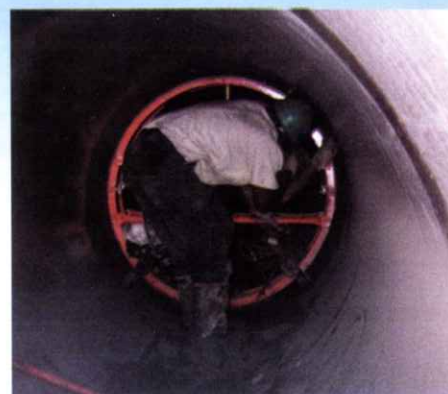
**May 2002**

## HOBAS PIPES REPLACE DEEP HARBOR TUNNEL LINE

**N**early a mile of 54" HOBAS centrifugal cast fiberglass reinforced polymer mortar (CCFRPM) pressure pipes now deliver all of the sewage from the Charleston, South Carolina peninsula to the Plum Island WWTP. The new tunnel, which passes under the Ashley River at a depth of over 100', replaces the original line, constructed with 36" pre-stressed concrete cylinder pipe



Lightweight, 20' sections of HOBAS 54" pipe made transporting with the cart in the tunnel easy.



Every HOBAS gasket-sealed joint was leak-free during a 10 psi air test after assembly.

### I N S I D E



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installed just 30 years ago, which was badly deteriorated and leaking severely.

#### CRITICAL APPLICATION

Because of the short service life of the first pipeline, and the extreme difficulty and high cost of future access, building a long lasting system was of prime importance to project engineers, Jordan, Jones and Goulding of Charleston. To survive, the new har-

bor crossing pipe had to be corrosion resistant to both brackish water and septic sanitary sewage. Additionally, due to cover depths up to 122' and an external head pressure of up to 117', long-term structural integrity and leak-free joints were a must. Further, pressure rated pipes and joints were required to withstand internal heads of up to 120'. Lastly, a pipe system constructible in a tunnel was needed. To satisfy these critical parameters, the specifications included only 3 products; class 200 ductile iron with ceramic epoxy lining and asphaltic coating, SDR 26 HDPE and SN 36 class 100 CCFRPM.

(continued on page 7)



# MANHOLES FOR HOBAS SEWERS - MANY OPTIONS



*HOBAS tee base manholes are available in any size and angle.*

## INTRODUCTION

HOBAS pipes can be used with a wide variety of commercially available manholes including:

- HOBAS tee base system
- Cast-in-place concrete
- Precast concrete
- Barrel type (any material)

Additionally, others may be adaptable. Please contact us for assistance.

## HOBAS TEE BASE SYSTEM

**Description** - The HOBAS tee base manhole system consists of:

### BASE

HOBAS fiberglass reinforced polymer mortar tee

### RISER

Single or multi-piece fiberglass OR Concrete segments

### HOBAS Tee Base -

**Construction** - The HOBAS tee base is a factory fabricated part made from mitered sections of HOBAS centrifugal cast fiberglass reinforced polymer mortar pipe. It is produced in all diameters from 18" to 102" (currently). See photo.

**Versatility** - The HOBAS tee base is available with mitered angle turns for alignment changes. Diameter changes can be accommodated with reducers and drops (in several configurations) can be constructed for elevation changes. For traffic loaded manholes, the tee base neck diameter is normally at least one pipe size smaller than the riser diameter, but not larger than the mainline pipe size.

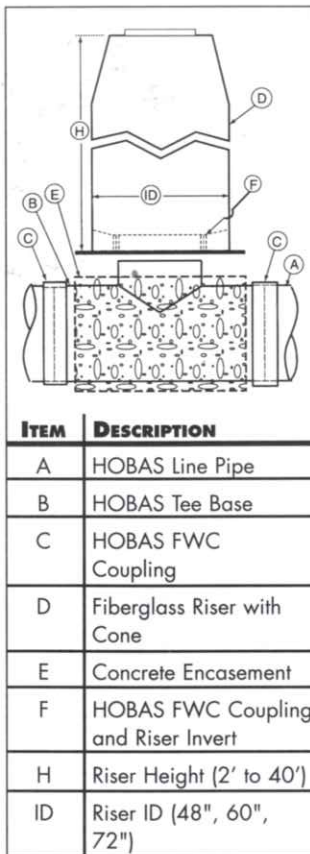
**Installation** - Connect the tee base to the mainline HOBAS pipes using one of the HOBAS leak-free, gasket-sealed, push-together joints. After assembly, encase the tee base in concrete to support the riser structure and to prevent distortion of the tee base from overburden loads.

## Fiberglass Risers -

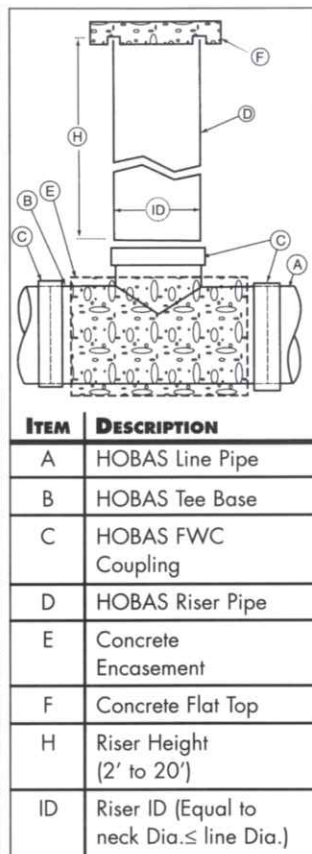
**One Piece** - Single section fiberglass risers with a reducing cone top, manufactured to meet ASTM D3753, are available from other companies in standard diameters of 42" to 72" and in lengths up to 40'. These parts are assembled to the neck of the HOBAS tee base using the HOBAS FWC gasket-sealed coupling, which is fabricated into the bottom of the riser (see Figure 1). This connection is quick and leak-free.

**Multi-Piece** - Up to 20' long sections of HOBAS CCFRPM pipes may be used individually or in tandem (for very deep manholes) to construct the riser. Connect to the tee base neck, and between riser pipes, if necessary, with HOBAS gasket-sealed joints. A flat concrete top must be fabricated by the installer to support the ring and cover (see Figure 2). This manhole configuration is not suitable for traffic loading. Alternatively, support the riser directly on the tee base encasement (riser diameter must be larger than the tee base neck diameter).





**FIGURE 1** - HOBAS Tee Base Manhole System with Riser & Cone



**FIGURE 2** - HOBAS Tee Base Manhole System with Riser & Flat Top

**Concrete Risers** - Reinforced concrete segments supported by the tee base concrete encasement may also be used to construct the riser.

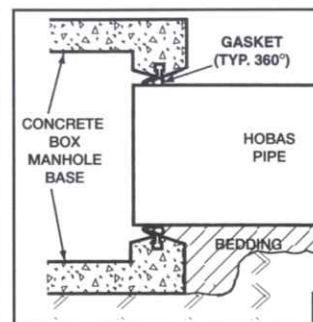
**Laterals** - Join laterals to the tee base or fiberglass risers with tee fabrications or with rubber boot connectors.

## CONCRETE MANHOLES

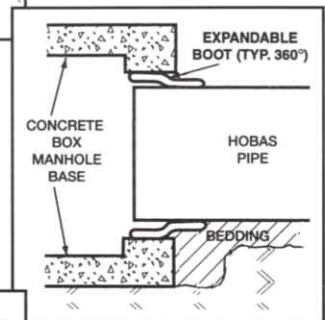
HOBAS pipes can easily be connected by traditional methods to many precast or cast-in-place concrete manholes as shown in Figures 3 to 6. Other methods may be suitable. Please contact us for assistance.

## BARREL TYPE MANHOLES

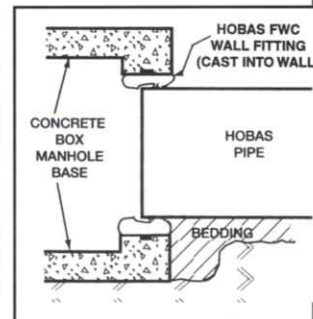
HOBAS pipes may be used with barrel type (cylinder) manholes constructed of concrete, fiberglass or other materials. Appropriate connections to these structures include those illustrated in Figures 3 to 6 in addition to fabricated tee side outlets. Please contact us for assistance to determine the most suitable alternative for your application.



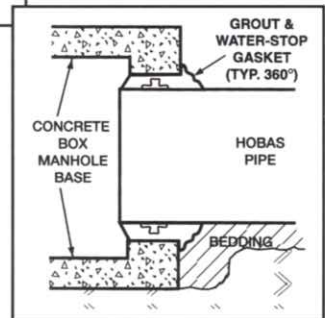
**FIGURE 3** - Cast-In Gasket Connection



**FIGURE 4** - Expandable Boot Seal Connection



**FIGURE 5** - Hobas FWC Wall Fitting Connection



**FIGURE 6** - Grout with Water-Stop Connection

## BENEFITS

>> HOBAS pipes may be used successfully with manholes of almost any material and configuration.

>> Using the all-fiberglass tee base system:

- Long life due the inherent corrosion resistance
- Leak-free performance due to the tight, gasket-sealed connections
- Fast installation due to the lightweight, one-piece risers and push-together joints
- Low head loss due to the channel flow





# FORWARD THINKING NETS HOBAS



Using the backhoe to handle the 4 ton 84" 20' long HOBAS pipes saves \$.



Dumped crushed rock provides good pipe support without compaction saving labor cost.



Long-term UV resistance and high strength make HOBAS pipes ideal for aerial crossings.

**B**ecause of their forward thinking, nearly half a mile of 84" diameter HOBAS centrifugally cast fiberglass reinforced polymer mortar (CCFRPM) pipes, with inherent corrosion resistance, were installed by several methods for a new relief line for the Trinity River Authority (TRA) in Grand Prairie, TX. These sanitary sewer pipes are part of the expansion of the West Fork Interceptor to accommodate flows being diverted from Arlington's Fort Worth Village Creek WWTP to TRA's Central Regional WWTP.

## NEW THINKING

Although TRA had successfully used large HOBAS pipes in their sanitary sewers twice previously over the last ten years, most of their big diameter pipes have been unlined RCP. However, since the unprotected concrete pipes have suffered severe interior corrosion damage in only 10 to 15 years of service, new thinking was applied to this project. With an eye towards building a system with a long service life, the specifications written by Turner, Collie & Braden of Ft. Worth, included two options to the unlined RCP. One alternative called for a 360 degree liner in the concrete pipes using Linabond (a combination of polyurethane & PVC). The other

option was SN 46 CCFRPM pipes. TRA indicated that the award would be made based on the lowest bid with either of the alternative materials provided that offer was within the \$2.5 million budget constraint.

## 33% BELOW BUDGET

The bid of Johnson Brothers of Dallas of \$1,673,971 using HOBAS CCFRPM pipes was the lowest of the corrosion resistant options beating the lined concrete by over \$200,000. Since their proposal with HOBAS beat the budget by 33%, the job proceeded with Johnson Brothers and CCFRPM pipes.

## SMOOTH INSTALLATION

All of the CCFRPM pipes were delivered with gasket-sealed joints; FWC couplings for the open cut and aboveground portions, and flush joints for the tunnel pipes. Johnson Brothers reported assembly using their backhoe and a sling to choke "home" the pipes (on the open cut), was quick and sure. The nearly 2000' of direct buried pipe with cover depths up to 15 feet, was surrounded with 0.75" minus crushed rock. This installation proved very effective with no vertical pipe deflec-

tions measured over 2%. A 200' plus liner plate tunnel constructed under Beltline Rd. was finished by filling the annulus around the HOBAS carrier pipes with pea gravel. Finally, a 140' segment was supported on piers spaced at 19.5-foot intervals. Approximately 100' of these pipes were subsequently buried with up to 7 feet of cover. All of the joints in the completed installation were air tested at 5 psi with no leaks confirming that the bottle-tight joints were properly assembled.

## Now HOBAS PREFERRED

So trouble-free was the CCFRPM pipe installation that Johnson Brothers' personnel stated that they love HOBAS pipes. TRA now prefers HOBAS pipes for their large sanitary sewers. They recognize that the life cycle cost of sewers built with HOBAS CCFRPM pipes is substantially lower, even if the initial cost is sometimes slightly more. In fact, HOBAS pipes were installed on another TRA project already, the Bear Creek Interceptor near DFW airport. In addition, TRA is also planning more sewer lines for HOBAS CCFRPM pipes in the near future.



# CORROSION RESISTANCE KEY TO HOBAS SELECTION

**W**hen the City of Burlington, NC recently extended their sanitary sewers, the inherent corrosion resistance of HOBAS centrifugal cast fiberglass reinforced polymer mortar (CCFRPM) pipes led to their selection for the majority of the new interceptors on the Great Alamance Creek projects. Phase 1 utilized over 3 miles of 42" SN 46 (minimum pipe stiffness of 46 psi) pipes with HOBAS FWC gasket-sealed, push-together coupling joints.

## LIMITED SPECIFICATION

Although corrosion resistance to a septic sewer condition was of primary importance, other critical issues included a leak-free system and the structural capability to safely withstand deep covers up to 30 feet. With these criteria in mind, the specifications for buried pipe prepared by the project design firm of Alley, Williams, Carmen & King of Burlington, allowed only two materials, ductile iron with ceramic epoxy lining and CCFRPM.

## HOBAS WORTH MORE

All bidders were required to submit an installed price for both pipe material alternates. HOBAS was bid lower by some contractors and ductile iron lower by others, although, the winning proposal from Beers Construction Company of Winston-Salem had ductile iron slightly less. Regardless, the City (Burlington) decided that HOBAS pipes were worth the small premium due to their superior corrosion resistance and, therefore, made the award to Beers based on CCFRPM pipes for the buried portion.

## FIRST TIME SUCCESS

Although a first time installer, Beers reported the installation to be trouble-free. Assembly was easily accomplished using the backhoe and lifting sling to "choke" the spigots "home". The same equipment made handling of the 20-foot long, 1.2-ton sections simple and inexpensive. Pipe



*Push-together FWC coupling joints were assembled quickly using the backhoe sling.*

zone backfill was crushed rock with a complete surround for deep covers and placed only to springline for depths up to 18'. This burial was very effective as measured deflections ranged from nil to 2.5% with most checks below 1% including a 0.5% value at the deepest location! Further, the entire system was air tested with no leaks including the FWC coupling connections between the buried HOBAS pipes and ductile iron aerials! The banded rubber boot connections to the concrete manholes also proved successful due to the smooth, constant OD of the CCFRPM pipes.



*Field length adjustments are easy & quick because of the HOBAS pipe constant O.D.*



*Crushed rock bedding was only needed to springline for medium depths due to the HOBAS pipe high stiffness.*



*Banded rubber boot connections to the manholes performed well due to the smooth exterior surface of HOBAS pipes.*



*The backhoe easily handled the 1.2 ton 42" HOBAS 20' sections.*

## SATISFIED CUSTOMERS

Beers was delighted with their HOBAS installation and praised the pipe for easy, sure assembly, quick field length adjustments and interchangeability with ductile iron (both pipes have a 44.5" OD). The City's satisfaction was reflected in their decision to pay an additional \$35,000 on phase 2 for 11,300 feet of 30" CCFRPM pipe so the flattest portions of that line would also be HOBAS instead of lined ductile iron.





# HO HUM REHAB IN LAS VEGAS



Lightweight HOBAS pipes handle easily with the backhoe (45" 20' long 3,000 lbs).

**A**lthough rehabilitation of big sanitary sewers is normally associated with our older, larger cities, now, even the City of Las Vegas has joined the group by renewing their Sloan Lane Interceptor. The renovation utilized over 12,500 feet of 40", 45" and 51" HOBAS centrifugal cast fiberglass reinforced polymer mortar (CCFRPM) pipes to slipline the existing RCP host.

## UPGRADE NEEDS

The Sloan Lane line was originally built as a storm sewer and was later converted to sanitary use. Therefore, these RCP pipes needed renewal to provide corrosion protection against sulfide caused deterioration and to upgrade the joints to prevent infiltration. Since the existing 45", 51" and 57" pipes were quite shallow (only 1' to 8' of cover), both an open cut replacement and a lining option were bid. The replacement alternative allowed three pipe materials: reinforced concrete with 360 degree PVC lining, profile wall PVC and CCFRPM, all in diameters 42", 48" and 54". For the lining option, the specs included cured-in-place pipe (CIPP) or sliplining with CCFRPM pipes. The existing pipes are all in streets and the specs required new manholes at 800' to 1000' spacing regardless of the construction method and product selected.



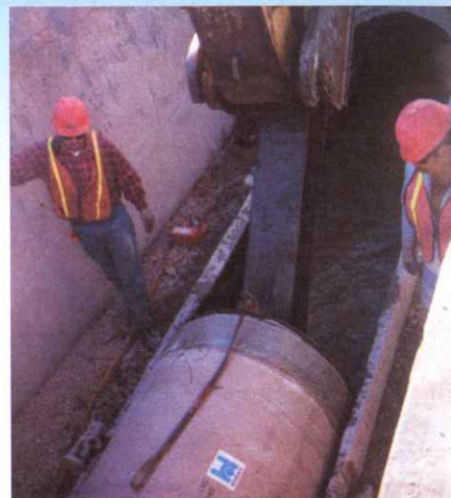
Barnard's push ring fit into the bell end so the backhoe could drive the pipes.

## SLIPLINING LOWEST COST

The winning bid of Barnard Construction of Bozeman, MT, was based on sliplining with CCFRPM pipes. Lining proved slightly less expensive despite the shallow depth, primarily because of the in-street alignment. Sliplining was lower cost because the CCFRPM pipes could be installed in live flow, thereby eliminating the by-pass pumping needed for CIPP. Despite the approximate 10% diameter reductions, the flow capacity of the renovated line was actually increased slightly due to the excellent hydraulic characteristics of the HOBAS pipes.

## PROBLEM FREE

To facilitate the slipline insertion, the CCFRPM pipes were delivered with flush, gasket-sealed, bell-spigot joints to maximize the clearance (1" to 1.5" radial). Because of the shallow cover depth and the limited drive



Using the push ring and backhoe, no pipes were damaged during insertion.



1000' of pipes were inserted into the live sewer in just 4 hours.

distances (due to the new manholes spacing), Barnard used a backhoe to push the pipes. Even with a half full sewage flow condition, 1000' runs were installed in half a day. Grouting of the annulus in one lift using a 42 pcf mix, completed the installation. With no leaks and no pipe breaks, the project was termed, "ho hum" by Barnard's crew due to the lack of problems. So pleased were all parties, that Barnard is using HOBAS pipes again in tunnels in Lubbock and the City of Las Vegas is installing two miles of 42" and 60" Hobas jacking pipes on the U.S. 95 Rancho sewer project.



## DEEP HARBOR TUNNEL

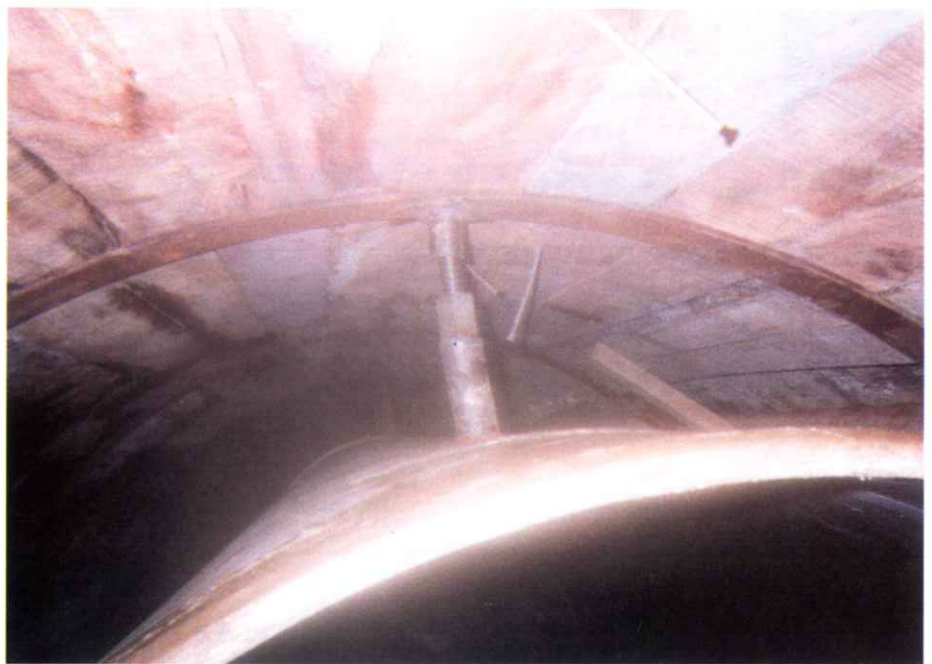
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### HOBAS BEST VALUE

The bid documents required installed pricing for all three material alternates from every contractor with the owner having the final choice of products. Affholder, Inc. of Chesterfield, MO, was awarded the job with a price of \$10,687,500 using HOBAS pipes in the tunnel at a \$150,000 premium over ductile iron because the CCFRPM pipes were deemed to have a longer service life in this application and superior abrasion resistance. HDPE pipes were not competitive due to installation complexities related to fusing joints in a deep tunnel.

### HOBAS Aids INSTALLATION EASE

After constructing the access shafts near each shore, Affholder bored a 96" diameter tunnel under the river and installed a steel ring beam & wooden lagging liner (88" ID) as he proceeded. The 20' long HOBAS 54" pipes were then carried in on a cart, one at a time, through the Plum Island shaft. The first pipe was placed at the opposite end (over 5000' away) and successive pipes



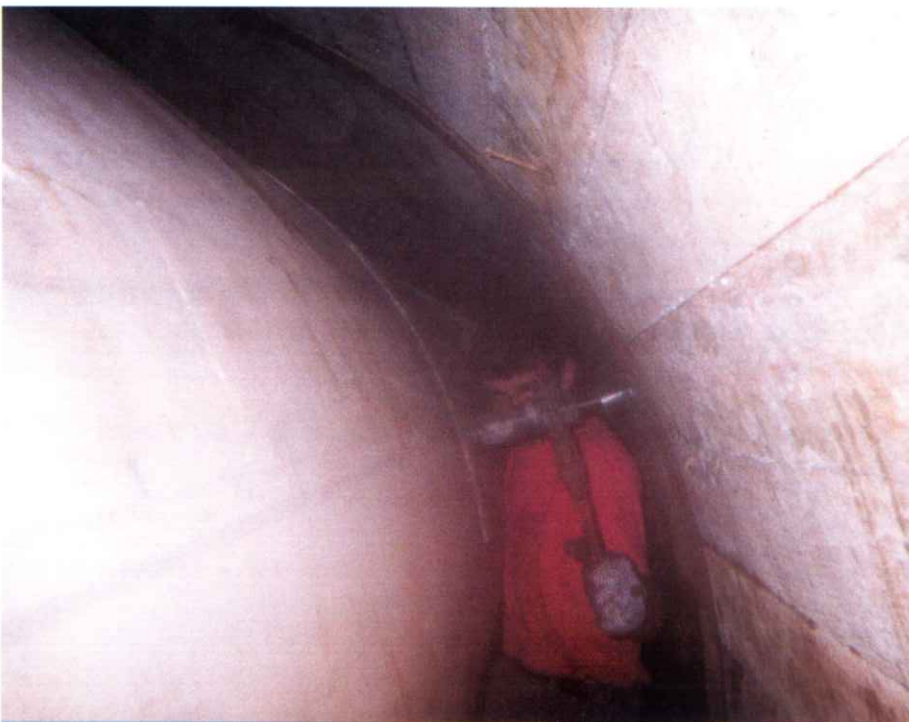
*High strength HOBAS pipes needed only 2 flotation restraints per section.*

were added to build back to the Plum Island termination. Each pipe was set to grade and the gasket-sealed, FWC coupling joint was "homed" using both the tunnel "dingy" (to push) and a winch (to pull) simultaneously. Next, two 3" wide, 90 degree arc steel flotation restraints were fixed from the tunnel ceiling to the pipe crown and tightened using screw adjustments. This procedure was repeated through-

out the tunnel, even through a 1000' radius curve that was fabricated without any elbows due to the angular rotation capability of the FWC coupling joint. The operation was so well planned and executed, that all of the 57" OD CCFRPM pipes were installed and blocked in less than one month!! Installation ease was aided by the HOBAS pipes' lightweight construction, long lengths and smooth, constant OD surface.

### HIGH PERFORMANCE

Just after each joint was assembled, a 10 psi internal air test was conducted to assure a leak-free connection was achieved. Out of over 250 joints, only two failed. These two joints were immediately disassembled, cleaned, relubricated and rejoined, at which time they tested leak-free also. The installation was finished by grouting the annulus with a 32 pcf mix placed in two lifts through the 2" stainless steel bushings in the 54" pipes' wall. After completion, inspections revealed no measurable distortion of the pipes and no grout leakage into the pipes! The final test of the system was the application of a 120' head by filling the Plum Island shaft to the surface. This successful event verified the soundness of the new HOBAS tunnel to the delight of all involved.



*Screw adjustment allowed precise and quick tightening of flotation restraints.*



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