Twenty-Four Years and Still Sealing Pipe Penetrations

The Link-Seal Model-C sealing element is manufactured from EPDM black rubber that handles temperature ranges –40 to +250°F. During installation, the rubber link is compressed to fill the annular space between the pipe's outer diameter (OD) and the wall penetration by means of pressure plates molded from Reinforced Nylon Composite and formed so that pressure is transferred to the sealing element uniformly. As a hydrostatic seal, Link-Seal modular seals are rated at 20 psig (40 feet of head).

Link-Seal modular seals are designed for use as a permanent seal. Seal elements are specially compounded to resist aging and attack from ozone, sunlight, water and a wide range of chemicals.

Link-Seal modular seals were installed in 1979 by the Limbach Co., on the original Ypsilanti Wastewater Treatment Plant. Michael Jessee, the plant maintenance superintendent, said that the more than 100 pipe seals in use throughout the plant have shown no noticeable leaks in the 18 years he has been at the plant. This is due in part to the design of the 15 available models of Link-Seal modular seals capable of handling from a ½″-OD pipe up to a 120″-diameter pipe.

The plent upgrade included non-metallic Century-Line sleeves to prevent previous rust stains on the wall caused by condensation from the steel sleeves.

These seals are designed for use as a permanent seal. Seal elements are specially compounded to resist aging and attack from ozone, sunlight, water and a wide range of chemicals. The carbon bolts and nuts feature a zinc dichromate proprietary organic corrosion inhibiting coating. For extreme treatment plant water conditions, 316 stainless steel bolts and nuts are used.

For the Ypsilanti Wastewater Plant's 2002, $100 million plant expansion, the consultant engineer Tetra Tech MPS of Ann Arbor, Mich., specified Link-Seal modular seals as a prime wall penetration sealer. Marty Schlitt, project manager for the John E. Green Co., the awarded mechanical contractor, said that there would be more than 100 sealing applications through 48″ pipe with multiple cored holes. Schlitt prefers the Century-Line sleeves for the cast in-place applications. These HDPE sleeves will eliminate rust stains on the walls resulting from moisture condensing and dripping from the original installed steel sleeves. HDPE also provides excellent resistance to acids, alkalis and other organic solvents found in treatment plant environments.

For more information on this subject, circle 862 on the reader service card.

Products At Work continued on page 40

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Upgrading Potable Water Storage Facilities

Storage of treated potable water in earthen, rock and concrete basins long has been an acceptable practice for water agencies. However, outbreaks of water-borne disease have led to concerns by public health agencies about recontamination of treated water and pressure for stricter standards for the storage of treated water. These demands, in turn, have caused many agencies to upgrade their water storage facilities, some of which originally were constructed 50 to 100 years earlier.

One such project undertaken by the Massachusetts Water Resources Authority (MWRA) with the assistance of Greeley and Hansen and Klein and Hoffman, Inc., has been the upgrade of the Fells Reservoir from an open to a covered reservoir.

Original Construction

Fells Reservoir is located on Commonwealth of Massachusetts land within the Middlesex Fells Reservation, a 2,000-acre reserve containing a diverse landscape. The original reservoir was constructed between 1898 and 1900. It is located within a natural basin, 8.5 acres in size. To construct the reservoir, the basin was closed off with earthen dams, creating a reservoir with a capacity of 41.4 million gallons. The original construction included a stone masonry gate house, now designated as a landmark structure, to control supply and distribution flows to and from the reservoir.

An expansion in 1940 added two additional basins, increasing the reservoir's capacity to 85.2 million gallons. A gaseous chlorine disinfection system was installed at that time in the gate house to provide disinfection at the reservoir's outlet.

New Storage Sectionalized

Initial studies concluded that the existing open storage basins should be taken out of active service and that operational storage capacity should be provided by constructing a new covered water storage facility to be located within an inactive basin of the reservoir. Preliminary studies also concluded that the operational storage capacity should be 20 million gallons. The final design features three storage tanks, two with a capacity of 5 million gallons and one of 10 million gallons.

Planning the project required meeting regularly with state, local and private environmental activist organizations to achieve consensus on minimizing environmental impacts on the area. To maintain the reservoir's natural appearance, it was agreed that the new covered storage facilities be constructed entirely below ground. This posed a challenge since no structure except for the historic gate house could be visible above ground.

New Supply Lines Utilize Welded Steel and Cathodic Protection

Other design challenges included replacement of existing 36″ supply and distribution pipelines originally constructed in 1898 and 1940. The 1898 pipeline was constructed of cast iron with lead joints and the 1940 pipeline was constructed of riveted steel. The final design for the replacement pipelines called for welded steel pipelines coated and lined with corrosion-resistant, NSF-approved epoxy. A cathodic protection system would provide long-term corrosion protection. Since the new pipelines occupy the same locations as the existing pipelines and at least one of the existing pipelines had to remain in service throughout the construction period, a sequence of construction was specified to allow one pipeline to be taken out of service, demolished and replaced, while the other pipeline remained active.

The final design for the replacement pipelines called for welded steel pipelines coated and lined with corrosion-resistant, NSF-approved epoxy as well as a cathodic protection system to provide long-term corrosion protection.

Construction Sequence Kept Gate House in Service

Restoration and modernization of the gate house posed both design and construction challenges. The project included replacement of 12 existing manually operated sluice gates (many originally installed in 1900) with the new motor-operated sluice gates and replacement of the existing stone operating level floor with a new reinforced concrete floor slab. This equipment had to be replaced while the facility remained in operation. This required developing a detailed construction sequence to allow certain portions of the gate house to be taken out of service and dewatered to facilitate gate replacement. Due to the historical nature of the structure, the exterior of the building was restored to its original appearance.

Appurtenances Upgraded

A new emergency chlorination system as well as heating and ventilation, gas detection, lighting and intrusion alarm equipment was installed. Other facilities included in the project were a new buried meter vault housing two 36″ venturi meters and a below-grade control structure. These facilities monitor, regulate and circulate flow into each of the three covered storage tanks. Multiple inlet/outlet ports located in each tank provide operational flexibility and promote turnover and hydraulic mixing within each tank. Splitting the flow to different sections of each tank or alternating the inlet/outlet point can be used to minimize stagnant zones, thus assuring that a high water quality is maintained.

Minimal Complications During Construction

Construction of the facility began in February 1997 and progressed through to completion in October 1999 with minimal complications. The $13.2 million project has improved the water quality in Boston's suburban communities of Melrose, Stoneham, Wakefield, Saugus, Lynnfield and Peabody.

For more information on this subject, circle 861 on the reader service card.