



Preventive Maintenance

City of Vancouver, WA, Uses Coatings To Prevent Corrosion

Infiltration, inflow, and corrosion eventually cause the deterioration of any sewer system - ultimately requiring costly rehabilitation or replacement of failed structures. The rate and extent of deterioration varies with many factors. The primary cause is microbial induced corrosion (MIC).

And in systems near industrial sites, fluctuation of acidity and alkalinity of sewage flowing through the system also contributes to deterioration. The U.S. Environmental Protection Agency mandate requiring "clean up" of industrial sewage before it enters a sewage system actually can increase corrosion by removing heavy metals that kill bacteria which cause MIC.

Various methods of rehabilitation are used to prolong the life of aging systems, but progressive cities are taking steps to prevent new structures from being eaten away by exposure to MIC derived sulfates.

Epoxy coatings to structure interiors, applied before a structure is placed into service, provide a high level of sulfate protection, stopping deterioration and significantly prolonging structure life.

The City of Vancouver, WA, overlooking

the Columbia River across from Portland, OR, is using epoxy coatings to protect new lift stations and manholes installed in extensions to the city's sewer system constructed to serve new developments. New sewer extensions are put in place by developers in accordance with proactive city specifications. In Vancouver, rolling terrain requires lift stations to pump sewage to a point where it enters a gravity-flow system.

"To protect structures of the expanding system, we require coating or lining of concrete wet wells at pump stations and discharge manholes," says Donald Skaggs, senior civil engineer of the Vancouver engineering department. "The coatings create an impermeable barrier to stop corrosion, reducing future maintenance costs, and extending life of the structures."

Protective coatings

Gene Skyles, owner of Molecular Inc., Clackamas, OR, is a specialist in applying protective coatings. Three lift station projects illustrate how the procedure is accomplished.

"One lift station is 22 feet deep and 16

feet in diameter with four 12-inch drop inlets," he says. "The second is 16 feet deep and 12 feet in diameter with three drop inlets. The other is 6 feet in diameter, 25 feet deep, and houses two pumps. The same basic steps were used to prepare and coat each structure."

First, the surface to be coated is cleaned with a high-pressure water blast system. Next, small holes in the surface of the concrete are filled with a coating of compatible high-strength, quick-setting hydraulic cement or epoxy mortar.

This is followed by application of penetrating epoxy primer when the concrete surface is very dense, or if large areas of smooth aggregate have been exposed.

Then the first 40-mil coating of epoxy is applied, followed by a second coat of the same thickness within 24 hours. Coating thickness requirements vary according to the profile of the surface being protected, forces such as hydrostatic head pressure, and the need to structurally rebuild a structure. Coatings are applied with a custom-designed plural component heated airless spray system to handle the thick, solvent-



free resins.

Primer used was Aquatapoxy A-10, followed Raven 404, both solvent-free epoxy coatings manufactured by Raven Lining Systems, Tulsa, OK. Aquatapoxy A-10 is a solventless, 100 percent solids, low-viscosity epoxy formulated for use as a primer or sealer on concrete, masonry and steel surfaces. It can be applied to damp or dry surfaces and dries without shrinkage. Raven 404 is an ultra high-build, 100 percent solids epoxy which forms a strong bond to concrete, masonry, steel, fiberglass and other surfaces. Its high moisture tolerance allows 404 to be applied in damp and moist environments such as underground wastewater structures. It can be applied to thicknesses of up to 125 mils in a single coat to quickly rehabilitate severely deteriorated surfaces.

"When we evaluate which lining products to use," says Skaggs, "we consider results of tests conducted by Los Angeles County. LA County has tested more than 90 different products and shares the information with other cities. We also consider recommendations from other cities."

Raven 404 meets the City of Vancouver's requirements as a lining material for wet wells and manholes. It has been used by Vancouver for approximately two years with satisfactory results.

Standards

Skaggs says the city requires coatings be applied in accordance with the manufacturer's specifications to a thickness of 80 mils for moderately corroded concrete.

Correct surface preparation and application of coatings are critical to overall performance. If surfaces are not properly prepared, or coatings are improperly applied, they may not provide expected protection or can fail completely.

Skyles is a Raven Certified Applicator trained and qualified to apply products in accordance with manufacturer specifications. Certified applicators are trained in product handling and mixing, surface preparation, operation and maintenance of application equipment, and quality control.

Vancouver's sewer system is the fourth largest in the state, serving an area of more than 50 square miles. It includes two treatment facilities and one lagoon. The sewer system is expanding to meet the needs of the fast-growing area.

"In the past year," says Skaggs, "we have completed, are currently constructing, or are planning eight new pump stations for a system with only 30 stations in operation. That's a pretty dramatic increase."

Skyles' company has completed a variety of coating and lining projects on both new and existing structures. He believes that the combination of safe, proven products, custom application equipment, and trained and experienced applicators should result in the long-term performance solutions public works directors are demanding to address sewer system deterioration.

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Molecular, Inc., a Raven Certified Applicator, used Raven 404 to rehab a sanitary sewer lift station for the City of Vancouver, WA.



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"The coating creates an impermeable barrier to stop corrosion, reducing future maintenance costs, and extending life of the structure."

Donald Skaggs, P. E.,
City of Vancouver.

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