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MANHOLE REHABILITATION: ASSURING A QUALITY APPLICATION

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INTRODUCTION

As one of three components of the typical collection system, the manhole is a key element that allows entry to the rest of the collection system for periodic inspection, maintenance and rehabilitation. In addition to being constructed from a variety of materials, manholes have been configured in many shapes, configurations and depths to meet specific location requirements.

Unlike pipelines, where total failure and collapse may occur, manholes rarely reach a point of total collapse. The majority of manholes in the U.S. needing repair (nearly nine million), can be rehabilitated, not replaced, using a number of available technologies and products.

Technologies and products can vary from grouting to coating to lining, depending on the type of rehabilitation and future life expectancy. Application of these products can result in stopping infiltration/inflow, protecting the existing structure from corrosion and further deterioration and rebuilding of the

structure back to its former dimensions. Since a manhole is constructed of multiple components, those at the surface of the ground can readily and cost-effectively be replaced rather than rehabilitated.

For manhole rehabilitation products to be effective, the existing structure must be properly prepared through a variety of cleaning methods, and then inspected before a product is applied. Particular to coating and lining applications, the cleaning and preparation of the host structure should meet stringent requirements. Testing of the installed product may mean the difference between long-term manhole rehabilitation and short-term product failure.

REQUIREMENTS

Industry standards require that a product, when applied to an existing structure to protect it from deterioration, must be monolithic over the entire surface area. Monolithic can be defined as a material formed or composed of single, uniform material without joints or seams.

If a material is not monolithically applied to a properly prepared structure, several issues may occur. The material may begin to detach and peel away from the existing structure, allowing corrosive gases to penetrate the area between the coating or lining and the existing structure, thereby causing accelerated deterioration of the manhole. Or, if the applied material is not mechanically bonded and separates from the existing structure, infiltration may flow behind the coating or lining causing further deterioration, and subsequently migrating back into the collection system.

Installation should be inspected during three key phases of application including preparation, application and testing.

PREPARATION

Preparation of an existing concrete, brick or block manhole begins by thoroughly cleaning the structure, removing all unsound, deteriorated material and stopping all water leakage coming through manhole defects. Cleaning can be accomplished a number of ways.

Water blasting, with sufficient pressure and volume, will remove unsound material from a structure's surface. Equipment can vary from a low pressure of several thousand pounds to high pressure approaching 40,000 psi. The correct pressure for cleaning is often dictated by the type of materials to be removed from the existing structure surface. Heated water or steam may be required to remove FOG (fats, oils and grease). Grit blasting, using an aggregate material, may also be used to prepare the surface and, in some cases, an acid wash may be recommended.

Regardless of the method(s) used, the work should include cleaning the entire structure surface. Cleaning should be performed down to solid substrate, verified to industry-recommended testing procedures, such as visual inspection, surface testing and determination of vapor transmission. Inspection is typically best accomplished by a trained inspector who, by entering the manhole structure, examines all areas of the structure's surface before application of the product begins.

APPLICATION

Application of the product to the structure is accomplished by a qualified and experienced applicator trained in the technology being applied.

Application should proceed only after the condition of the cleaned structure surface has been verified as meeting the requirements for specific long-term coating or lining application. The product application should be monitored and inspected to verify that the manufacturer's recommendations for application of the material are met during the field application.

TESTING

The successful installation of manhole rehabilitation materials should be measured, and measurement should be based on specified quality control requirements (and associated quality assurances) to verify that the product will meet customer expectations. If the product is to be visually free of blemishes and defects then a visual inspection is performed. If the product is to be monolithic, then a holiday test is performed. If the product is intended to bond to the existing structure, then an adhesion test is required. If the structure is to be leak-proof, then a leakage test is performed. If the product must have specific physical properties and a specified thickness, then those must be tested and verified before the product application is approved by an inspector.

INSPECTOR REQUIREMENTS AND TRAINING

An individual, assigned to inspect the application of a manhole rehabilitation material, must be capable of safely entering a manhole - first during the preparation of the structure and then again after application of the product - and perform both visual and product testing as required in the contract documents. In some cases, product testing may be performed by the contractor and witnessed by the inspector.

Over the last several years NASSCO has launched an Inspector Training and Certification Program (ITCP) educational series. Over 900 inspectors have been trained in the U.S and Canada to inspect and quality assure the installation of the cured-in-place pipe technology.

ITCP for manholes is a training and certification program for inspectors to inspect grouting and coating and lining applications. This certification program is the second ITCP in a series developed by NASSCO for rehabilitation technologies.

For more information, please visit NASSCO's website at www.nassco.org.