

UCT 2017

NASSCO Round Table Presentation

MANHOLE RENEWAL-CEMENTITIOUS LINING

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One of the most effective methods to fully restore old manholes to “like-new” condition is to apply a cement-based liner at the appropriate design thickness to structurally reinforce, seal and protect.

- Structural reinforcement by creating a one-piece (monolithic) liner of sufficient thickness and strength to withstand applied forces encountered due to depth, dimension, shape, ground and water pressures, and dynamic traffic loads.
- Complete sealing against current and future leaks that try to enter at the invert, bench, wall, cone, corbel and adjusting rings.
- Protection against corrosion common to sanitary sewer environments that result from MIC – *microbiologically induced corrosion*.

Problems that are ignored or repairs that are delayed result in even more severe problems and much greater expenditures to correct. Problems with manholes are usually the result of 1) age – they have exceeded their design life; 2) leaks – ground water infiltration that in-washes surrounding soil that, in turn, weakens the supporting compacted soil-column resulting in partial or complete collapse; and, 3) corrosion – deterioration of the precast concrete or mortar joints by sulfide conversion to acid by bacteria that destroys the structural value of the original manhole.

Cementitious liners are commonly installed using one of two methods. The first is low pressure hand spraying from within the manhole followed by troweling to compact the cement liner into joints, cracks and voids and to create an even thickness and appearance. This method relies upon the experience and skill of the in-hole applicator. The second method is to centrifugally apply and compact the material safely from above the manhole. This method uses a bi-directional, high speed robotic applicator that continuously traverses the vertical interior of the manhole until the design thickness is attained.

Cementitious liners in manholes is an effective solution in price and performance. Some of the major advantages of cementitious lining are:

- **QUICK** – 3 man crew averages 4 to 8 manholes per day in just one set up
- **WATER TIGHT** – seamless shell withstands ground water pressures >100'
- **STRUCTURAL** – combination of strength and thickness restores full value
- **COST EFFECTIVE** – \$1,000 to \$1,500 per average manhole
- **VERSATILE** – low tech hand spray-trowel or high tech precision placement
- **EASY TO INSPECT** – wet gage thickness and C-109 cube test that confirm values
- **CORROSION RESISTANT** – options are type of cement or MIC additive
- **EASE OF ACCESS** – equipment easily transported to remote sites
- **ADAPTIVE TO CONDITIONS** *any diameter * any depth * any shape
- **SMALL FOOTPRINT** – compact equipment in one traffic lane
- **NON-DISRUPTIVE** – sewer flows can be active or internally diverted
- **PREPARATION** – high pressure wash and surface can remain wet
- **ENVIRONMENTALLY SAFE** – contains no dangerous chemicals to contaminate site
- **ASTM STANDARDS** – procedure controlled by F-2551

When polymer coatings are needed to protect against chemical corrosion, cementitious liners are the product of choice to form the structural underlayment and sealing prior to application of a coating.