Bay Area Clean Water Agencies
Collection System Committee

Manhole Rehabilitation Practices

Notes from a Committee Round Robin Discussion on September 6, 2012

Condition Assessment

Agency representatives reported the following practices regarding manhole condition assessment:

- Several agency representatives reported that they look at the condition of manholes as part of routine closed-circuit television (CCTV) work.
- One agency representative reported that the most common problems observed in manholes were loose frames and covers, older covers with eight to ten inch holes in the top (allowing for significant inflow and infiltration (I/I)), and aging concrete structures. He noted that many manhole problems are solved simply by replacing those frames and covers.
- While several agencies have staff members that are trained in the National Association of Sewer Service Companies' (NASSCO's) Manhole Assessment and Certification Program (MACP) defect coding protocol, representatives reported that in general they do not bother filling out the associated forms because they are too cumbersome. (Interestingly, NASSCO's website indicates that while they have developed this program for the coding of defects in manholes, this task was more challenging than developing their standard protocol for coding pipe defects "recognizing that manholes are much more complex structures than pipe…" http://nassco.org/training_edu/te_macp.html)
- One agency representative reported that the agency's manholes were fairly stable thus far (i.e., not requiring any significant rehabilitation or replacement).

Manhole Rehabilitation and Replacement

Agency representatives discussed various types of manhole rehabilitation activities, including replacing frames and covers, sealing joints around where the pipe enters the manhole, and applying coatings to the inside of manhole structures to stops leaks, seal joints, repair damage and provide structural reinforcement. Preference for rehabilitation versus replacement varied among agencies. A few agency representatives indicated that they only perform rehabilitation, while others only rehabilitate manholes if replacement is constrained by cost, location, or other factors. Several agency representatives reported that they prefer replacing rather than rehabilitating failing manholes, noting that manhole replacement is currently not prohibitively expensive. Two representatives indicated that this preference might change if and when the cost of replacement increases.

- Several agency representatives reported that manhole replacements, if needed, were generally performed as part of larger capital improvement program (CIP) projects (e.g., line replacement projects).
- A couple of agency representatives recommended specifying that new precast manhole sections be coated with epoxy (e.g., Xypex), before delivery.
- A question was raised about how to prevent infiltration between the pipe and the manhole. One agency representative indicated that his agency used a product called Sewper Coat to trowel into these seams to fill gaps. A representative from another agency reported that his agency required contractors to install a water stop around the pipe at the point where the pipe enters the manhole, and that this practice had helped prevent root intrusion.

- Several agency representatives reported that they contract out most of their manhole rehabilitation and replacement projects.
- One agency representative reported that the agency used slurry (a controlled low-strength material), in place of gravel backfill in manhole replacement projects to improve stabilization of the pipe.

Manhole Coating Products

A number of agencies use products to coat the inside of manholes to prevent I/I, seal joints, repair damage, and provide structural reinforcement. Various agency representatives made the following comments related to these coatings:

- The manhole does not have to be out of service for coating.
- Coatings cost one agency $1,800 for two manholes (with a two-for-one promotion).
- One contractor charged for coatings based on the depth of the manhole.
- Coatings were reported to range in thicknesses between one-half inch and two inches.
- Several products require applicators to be certified.
- In the past, one agency installed plastic forms inside the manholes which were then sealed with a product called De Neef (a water-activated polyurethane grout made by De Neef Construction Chemicals, Inc.), and then coated with epoxy. They moved away from this practice because the finished linings would be two inches thick and limit access.
- Two agency representatives reported issues with epoxy coatings sloughing off over time.
- One agency representative reported long-term success with epoxy liners and cast-in-place (drop-in liners), although they did note that they had experienced some erosion issues with the latter at the point where the concrete met the plastic.

Agency representatives recommended three manhole coating products, discussed below.

1. Xypex

Product name: Xypex

Manufacturer: Xypex Chemical Corporation

Product summary from website:

"Xypex is a unique chemical treatment for the waterproofing and protection of concrete… Xypex protects concrete and reinforcing steel. The Xypex treatment is highly resistant to most aggressive substances, pH 3 - 11 constant contact, pH 2 - 12 periodic contact."

Agency representative notes:

- A few agencies reported that they apply Xypex to waterproof cracks in concrete, and for other repairs.
- One agency reported that they specify that new precast manhole sections are coated with Xypex before delivery.
- One agency representative reported that the agency had some 20-year old Xypex repairs that were holding up well. Another agency representative also indicated success with Xypex repairs for preventing infiltration.

2. Mainstay Composite Liner

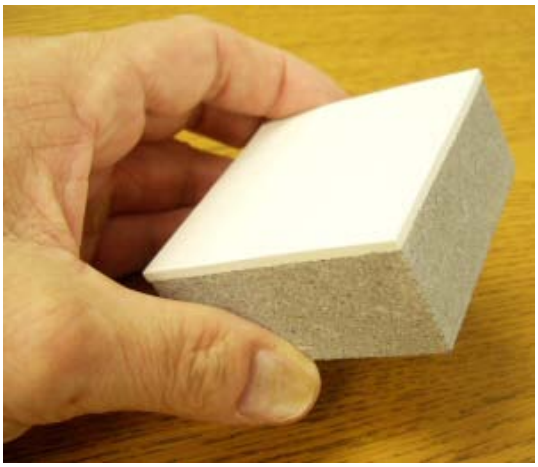
Product Name: Mainstay Composite Liner

Material: ML-72 mortar and the DS-5 Epoxy topcoat

Manufacturer: Madwell Products Corporation

Product summary from website:

"Mainstay ML-72 is a high strength restoration mortar that bonds tightly to properly prepared damp concrete and brick surfaces. Applied in a single application at thicknesses from 1/2" to 5", it restores deteriorated, rough surfaces, prevents water intrusion and provides a smooth, flat, dense surface. Immediately after finishing the ML-72 mortar, apply the Mainstay DS-5 Epoxy corrosion barrier at thicknesses up to 0.125" (125 mils) in a single pass using an airless or centrifugal spray. For certain applications, either the high performance DS-6 Novolac Epoxy coating or the DS-4 Epoxy Coal Tar coating may be used in place of the workhorse DS-5 Epoxy topcoat."



A cross section sample of the Mainstay Composite Liner

http://www.madewell.net/mainstay-composite-liner.html

Agency representative notes:

- Multiple agency representatives noted that they preferred this product and said that the coating provides corrosion protection. A sample was passed around the meeting.
- One agency representative indicated that they had to ask a Mainstay contractor to leave because they only had two people on site, which did not meet confined space entry requirements. They came back and did everything properly.
- One agency reported that H&R Plumbing and Drain Cleaning, Inc. had done a demo for them of the Mainstay product.

3. SewperCoat

Product name: SewperCoat

Manufacturer: Kerneos, Inc.

Product summary from website:

"SewperCoat® is a 100% pure calcium aluminate premix used for the rehabilitation of sewerage structures. It is also used as a lining for most wastewater structures in new construction applications. Because it is 100% calcium aluminate there is no 'weak link' in the material to cause potential problems in the H2S environment."

Before SewperCoat

Completed SewperCoat

http://armenv.com/projects/Cape%20Fear%20Wilmington%20MH1.pdf

Agency representative notes:

- A number of agencies reported that they use SewperCoat for manhole rehabilitation.
- Multiple agency representatives noted that SewerCoat is corrosion-resistant and offers a 10-year warranty (they will replace the product if it fails).

Raising Manholes for Street Paving

A number of agency representatives discussed issues related to raising manholes as part of street paving projects.

- Many agency representatives indicated that they coordinate with their respective cities (which are generally responsible for the paving), to elevate manholes for street paving projects. Some cities take full responsibility (financial and practical) for raising manhole frames as part of these projects. One agency representative noted that it cost the city approximately $600 to raise a manhole.
- One county representative noted the importance of having good working relationships with neighboring Cities and sewer districts, although even with these relationships in place, manholes occasionally had been paved over.
- Several agencies reported that their own crews raised manholes (i.e., replaced or installed iron risers, or frames), as needed, although one agency representative noted that it was a particularly difficult task. Another agency representative suggested using a super cutter (something like a circular saw).

Other Notes

- One agency representative indicated that they had experienced a recent rash of manhole cover thefts, and so the agency was looking into fiberglass options, noting however that they are lighter and that there is no way to secure them except with a latch and ring. A price quote for a 30-inch locking option from one supplier was $399 (compared to $299 for a comparable iron cover). A representative from another agency responded that they had used a high-density polyethylene (HDPE) manhole cover on an easement repair (because it was easier to transport in to the site).
- One agency representative reported that, for manholes in easements, the agency used locking lids and poured six foot by six foot pads to provide a secure surface for crews to stand on.
- One agency representative reported that the agency requires the use of temporary false bottoms in the manhole before construction starts (to keep construction debris from falling into the channel, and therefore from entering the collection system). However, this practice has only resulted in approximately a 50 percent success rate, as the agency has little control of how the contractor removes the false bottom (debris may be dumped or spilled into the wastestream during removal).