

Plastic Manhole Replacement Project Utilities Department Capitol Improvement Project # II05-03 Final Report

Project at a Glance

This project involved the replacement of six plastic manholes in the southwest part of Lawrence. The manholes were a source of inflow and infiltration into the wastewater collection system. Final results of the replacement project were new, structurally sound manholes and added capacity in the wastewater collection and treatment systems.

Project History

The six manholes were installed during construction of the Douglas County Yankee Tank Sanitary Sewer District No.3, Douglas County Project No. 90-13. Field inspections done early in 2005 revealed several plastic manholes were leaking with visible cracks. A decision was made to inspect all remaining plastic manholes throughout the area. A list was compiled of the necessary replacements, and specifications were written by in-house staff. Bids for the project opened on October 11, 2005. The replacement of the manholes began on December 5, 2005 and was completed on December 23, 2005.



Project Location

The manholes are located in the southwest portion of the City, in a low-lying area that has an abundance of standing water. Photo P.1 shows the environment surrounding the replaced manholes and the work conditions during the project. A map of the project area (P.2) is located below with the replaced manholes indicated by red dots.



Project Details

Once on site, leaks were found in the sidewalls and step areas of the plastic manholes, seen in photos P.3 and P.4. In addition, some manholes were partially inverted due to ground and water



pressure. Challenges during the replacement included a high water table (P.5) which made dewatering necessary and accessibility issues due the remote location of the site. Because of the high water table, it was decided to build a "manhole around a manhole" instead of the projected removal and replacement of the existing manholes. The new process would be accomplished by installing a form around the existing manhole (P.6), bracing the manhole from the inside and filling the annular space with concrete (P.7). The concrete used was a special mix design containing fiberglass and curing accelerator. Once the concrete was cured (P.8), the plastic manhole cone, ring and lid were removed and replaced with a concrete "flat top" and new ring and lid. (P.9)

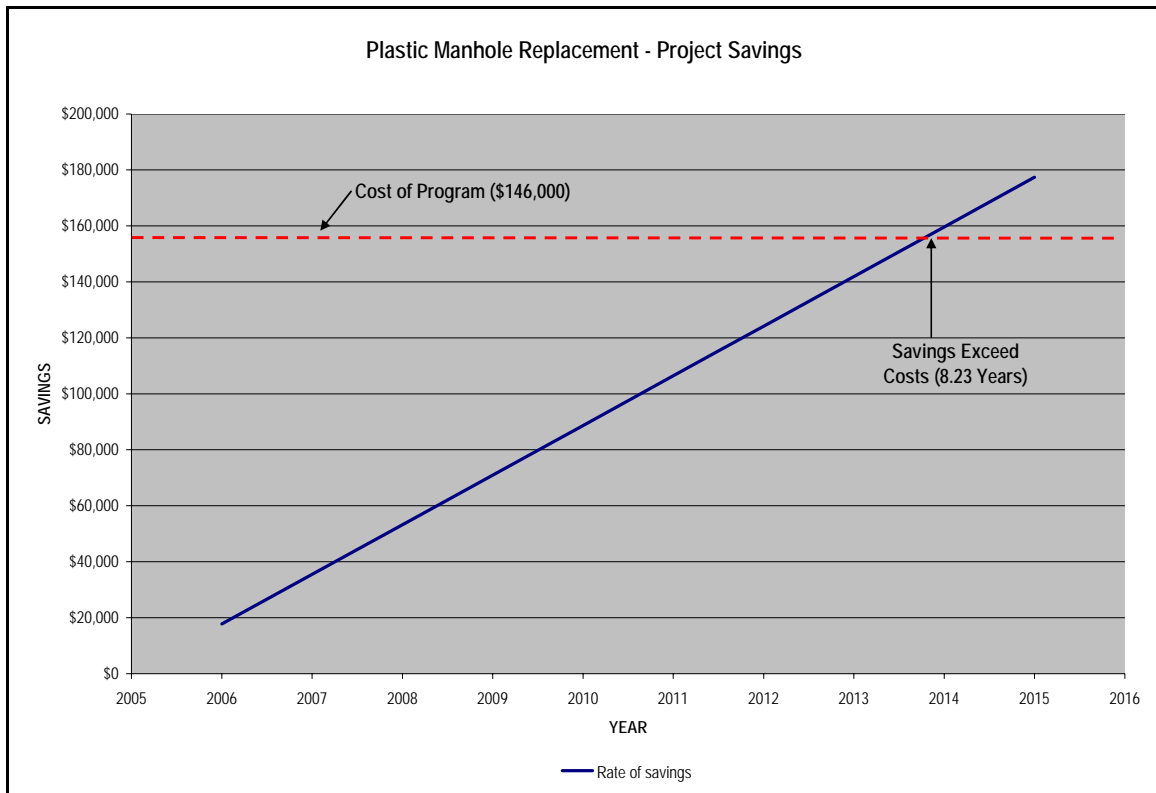


Project Cost and Savings

The total cost of the project was \$146,000. Collection Division staff estimates that the project will pay for itself within 8 years in wastewater treatment costs alone. In addition, to the treatment cost savings, due to the replacement there is now additional capacity in the collection systems and the costs to pump and transport the extraneous flow have been eliminated.

The table below illustrates the saving calculations for the project. The graph illustrates the timeframe it will take for the project to pay for itself in treatment cost savings.

Savings Calculations for Manhole Replacement Project	
45	average gallons/minute inflow from leaking manholes
64800	gallons per day inflow from leaking manholes
0.065	million gallons per day inflow
23.652	million gallons per year inflow
\$750	cost for treatment of 1 million gallons
\$17,739.11	annual treatment cost of inflow from plastic manholes
\$146,000	total cost of manhole replacement project
8.23	years for project to pay for itself in treatment cost savings



Summary

The replacement of the six plastic manholes in southwest Lawrence was necessary to eliminate a significant portion of inflow and infiltration in that section of the collection system. The manholes were successfully replaced using a new process consisting of forming the new, secure manhole around the existing one. Not only have the new manholes created more capacity in the collection system, but the savings in wastewater treatment costs will pay for the project itself in a relatively short period of time.

Submitted by,

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