



TECHNICAL SUMMARY

Questions?

Contact research.dot@state.mn.us.

Technical Liaison:

Steve Bot, City of St. Michael
sbot@ci_st-michael.mn.us

Investigator:

Derek Tompkins,
American Engineering Testing, Inc.

PROJECT COST:

\$59,676



Effectively compressing the soil around a catch basin during construction prevents future settling and heaving.



Putting Research Into Practice: New Information Resource for Manhole and Catch Basin Installation

What Was the Need?

Minnesota municipalities with underground storm and sanitary sewers also have manholes and catch basins (also known as storm drains). Typically spaced every 400 feet along streets, manholes provide workers entry into storm and sanitary systems for inspection and maintenance. Catch basins are also located along streets and in parking lots to catch and transport stormwater.

For example, Minneapolis has approximately 18,000 storm and 32,000 sanitary manholes. In addition, 55,000 catch basins are part of the city's stormwater management effort. Though nearly invisible despite their great numbers, these installations are an essential part of every municipality's infrastructure.

Some state municipal engineers were concerned about instances of settling and heaving around manholes and catch basins. After examining data from an initial study, a Local Road Research Board (LRRB) research committee learned that there was no information resource for construction or maintenance of catch basins, and existing information for manholes was insufficient and outdated. Many new products targeting the installation needs of these facilities could improve construction techniques and maintenance practices. Municipal engineers needed an accessible, comprehensive resource about manhole and catch basin installation and maintenance.

Researchers surveyed 83 municipalities and interviewed other engineers and product representatives to gather data about manhole and catch basin installation and maintenance practices. The resulting report provides current information for municipal engineers about these essential installations.

What Was Our Goal?

The project's goal was to provide an information resource about manholes and catch basins that addressed installation techniques, products and their application, and common maintenance issues. This resource would also include information about practices that mitigate settling and heaving around installations.

What Did We Do?

To gather information for this resource, researchers surveyed representatives from 83 municipalities and the City Engineers Association of Minnesota. The survey collected information about product selection, installation techniques, specifications and maintenance concerns.

The research team members interviewed some municipal employees to further document processes and concerns. They contacted industry professionals to learn more about proper materials and appropriate application techniques.

Researchers gathered information about construction methods and products, developing an extensive review of construction and repair products, and practices to prevent settling and heaving. They also collected engineers' experiences with products, considerations while working in the field, and guidance for new installation and repair of existing units.

What Was the Result?

Manholes and catch basins are typically constructed from three materials: precast reinforced concrete, cast-in-place concrete, and manhole bricks or blocks. All surveyed municipalities used

continued

“The final report is a valuable tool, collecting in one document all the best standards and products for preventing and addressing common manhole and catch basin issues, especially those experienced by Minnesota municipalities faced with frequent freeze-thaw cycles.”

—**Steve Bot,**
City Administrator/Public
Works Director, City of
St. Michael

“Catch basin and manhole issues can be challenging for a municipal engineer to investigate. Resources are scattered, with limited detail. This project provides a focused resource with special emphasis on Minnesota experiences and practices.”

—**Derek Tompkins,**
Principal Civil Engineer,
American Engineering
Testing, Inc.

Produced by CTC & Associates for:

Minnesota Department
of Transportation
Office of Research & Innovation
MS 330, First Floor
395 John Ireland Blvd.
St. Paul, MN 55155-1899
651-366-3780
www.mndot.gov/research



To prevent water from infiltrating manholes, sealants are sprayed on the inside and outside of manholes, and special gaskets are used between concrete sections.

precast concrete, five municipalities used cast-in-place concrete, and six cities used bricks and blocks only at the engineer’s discretion. Generally, wall thickness of 5 inches was specified for precast and cast-in-place manholes and catch basins.

The chimney section of the manhole, which connects the cone of the manhole with the pavement surface, showed the most construction variation among municipalities. All used manhole adjustment rings (also called extension rings), which span the distance between the top of the chimney and the pavement surface and assist with leveling.

Municipalities used both precast concrete rings and engineered polymer rings; 40% of respondents favored polymer rings and 21% did not. The number of respondents who favored concrete rings was nearly equal to those who found concrete rings less effective. This variation revealed some preferences were a matter of context and experience.

Methods to make manholes watertight varied among the municipalities, but some products were commonly used, such as rubber or butyl O-ring gaskets between joints; wrap materials, such as Infi-Shield Gator Wrap; sealing products such as Cretex internal joint seals for high groundwater areas; and other barrier wraps. These construction features all arise because installations are constructed below ground. They are subject not only to hydraulic pressure, but also to the enormous destructive forces of freeze-thaw cycles that occur in cold-weather states like Minnesota.

To prevent issues with settling and heaving, the information in the report includes methods to effectively backfill and compact the earth around the unit during construction.

What’s Next?

The project’s report will provide municipalities statewide and beyond with current information about installation, products and maintenance practices for manholes and catch basins.

This Technical Summary pertains to Report 2021RIC04, “Catch Basins and Manholes: Products, Installation, and Settlement and Heave Mitigation,” published September 2021. The full report can be accessed at mndot.gov/research/reports/2021/2021RIC04.pdf.