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Trenchless
TECHNOLOGY.

APRIL 2023

SUE AND

PROJECT PLANNING

KNOWING WHAT'S BELOW
KEY TO AVOIDING DELAYS,
CATASTROPHES

ALSO
INSIDE:

FEATURE

CONQUERING
CROSS BORES

FEATURE

STEPS FOR
UTILITY
LOCATING

FEATURE

WHAT IS THE
DAMAGE PREVENTION
INSTITUTE?



KNOWLEDGE OF SEWER GROUT BEHAVIOR ADVANCES

NASSCO's Infiltration Control Grouting Committee (ICGC) is set to release the Test Cell Grouting Research White Paper in early April 2023. This body of work not only documents the reason behind the research but also the construction of an above-ground test cell capable of the construction of a full-scale sewer trench and pipe installation with joint defects.

The objectives of the study were to test several grouting concepts specific to how grout behaves under a variety of gel times and pumping rates while conducted in a variety of pipe bedding conditions. Throughout the series of eight tests, observations were made after determining the general grout outline and washing away any loose materials using a low-pressure water hose. Each grout matrix was then dissected to determine the internal forms. An 11-person workgroup was formed within ICGC in 2021 to assess the observations, determine conclusions, and write a white paper based on the research. After completing the paper, NASSCO's Technical Advisory Committee (TAC) reviewed the document and reported back to the workgroup.

The study of soil stabilization via injection grouting is not new. The late Reuben Karol wrote in 1983, "Grouting is a procedure in which the grout replaces the natural fluids in the formation voids. For grouting to become a useful construction tool, displacement of the void fluids must take place at rates and pressure which



make grouting economically competitive with other construction alternatives." Karol taught chemical grouting as a senior and graduate elective at Rutgers University and the main area of study was soil stabilization and the materials used to achieve such; a practice continued today through Dr. C. Vipulanandan and the Center for Innovative Grouting Materials and Technology (CIGMAT) at the University of Houston. Past studies to date on grouting behaviors focused mainly on techniques for mass ground stabilization via injections provided by drilling or probing from above.

The Test Cell Grouting Research by NASSCO differs from the historical study of soil stabilization by Karol as it looks at the grout behaviors and their resulting formations when injected through pipe defects from sewer packers through open joints into bedding materials within a sewer trench. The observations during and conclusions made from the study ring back to Karol's findings that medium porosity, grouting viscosity, and gel times are key to

creating an ideal structure within soils — even when used as pipe backfill.

ICGC's white paper dispels the mysteries behind sewer grouting by providing key understandings about the behavior of sewer grout outside the pipe and within the confined sewer trench. Within the first observations, readers find that "the initial grout that exits the defect always permeates toward the bottom of the pipe embedment zone" leading to the conclusion that "longer gel times allow for the grout to fill the void spaces below the pipe, saturate the pipe bedding, stabilize the pipe, and create dams within the pipe trench." The study also provides visual side-by-side comparisons of the grouting formations above and below the pipes when using various gel times and within different bedding materials.

The test cell study conducted by ICGC quantifies the necessary information to provide engineers and municipalities the background to move forward with capital grouting programs to prolong system life cycles by stabilizing pipes, filling voids, and eliminating infiltration. Specifications for both capital grouting and pre-rehabilitation grouting are free to download through NASSCO's website, as well as the Test Cell Grouting Research White Paper.

For more information on sewer grouting or becoming a member of NASSCO's Infiltration Control Grouting Committee please visit NASSCO.org.

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