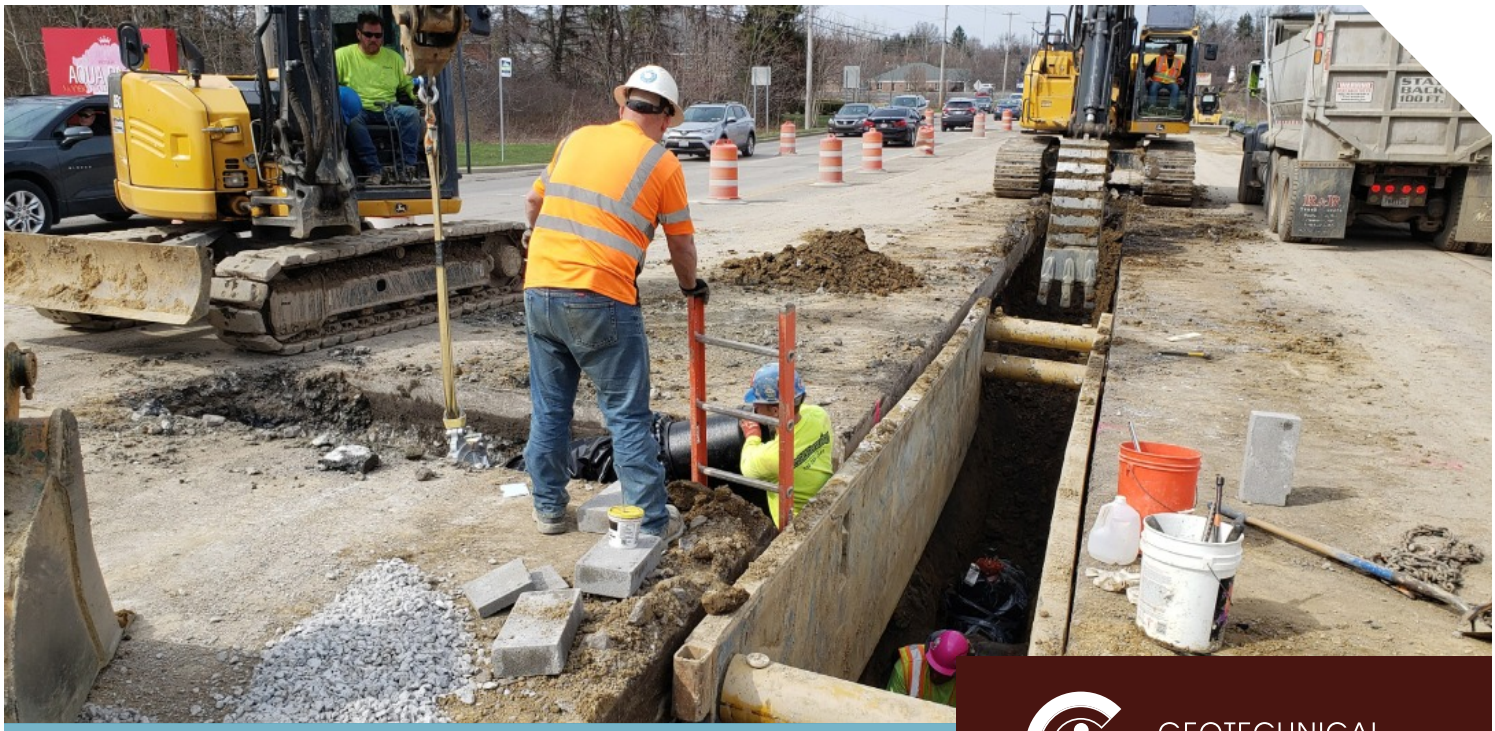


NEWSLETTER

GEOTECHNICAL CONSULTANTS INC.

Why Deep Trench Compaction Matters More Than Ever

July 2026

Improper utility trench backfilling can create expensive problems months to years after construction is complete.

Most owners, developers, and municipalities never see the critical work taking place at the bottom of a utility trench. Once a new sanitary sewer, water line, or storm sewer is installed, the trench is backfilled, the surface restored, and construction moves forward.

But what happens beneath the surface during backfilling can determine whether roads, parking lots, sidewalks and adjacent building foundations remain stable and serviceable for decades or begin settling and exhibiting distress.

As utility systems are expanded or rebuilt to serve new developments and infill projects, proper observation and compaction testing during utility installation can help prevent costly failures.

Deep utility trenches present unique challenges.

Many modern sewer lines are installed 10, 20, even 30 feet below street level. After installation, often hundreds of cubic yards of soil or stone must be placed as backfill into the trench and compacted.

Unlike large mass fill site grading operations that can be completed efficiently with large equipment, deep trench backfilling is performed in a confined workspace where every layer must be carefully placed and compacted.

This process is considerably more difficult than mass site fill because:

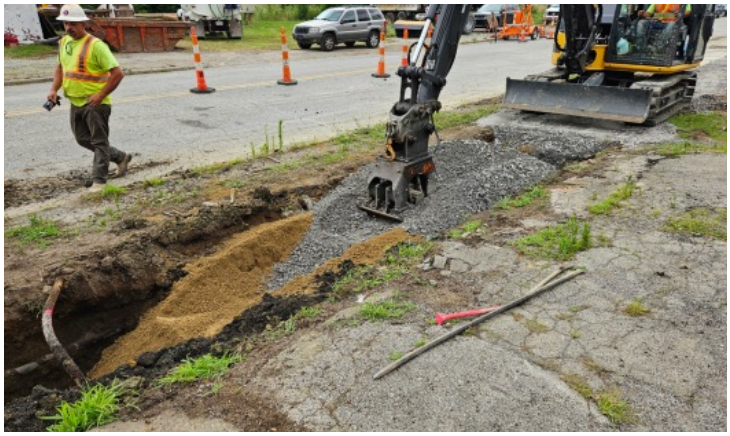
- The trench is narrow and confined.
- Specialized compaction equipment must be used.
- Soil must be placed in controlled lifts.
- Moisture content must remain within acceptable limits for proper compaction.
- The deeper the trench, the more difficult it becomes to verify compaction throughout the excavation.

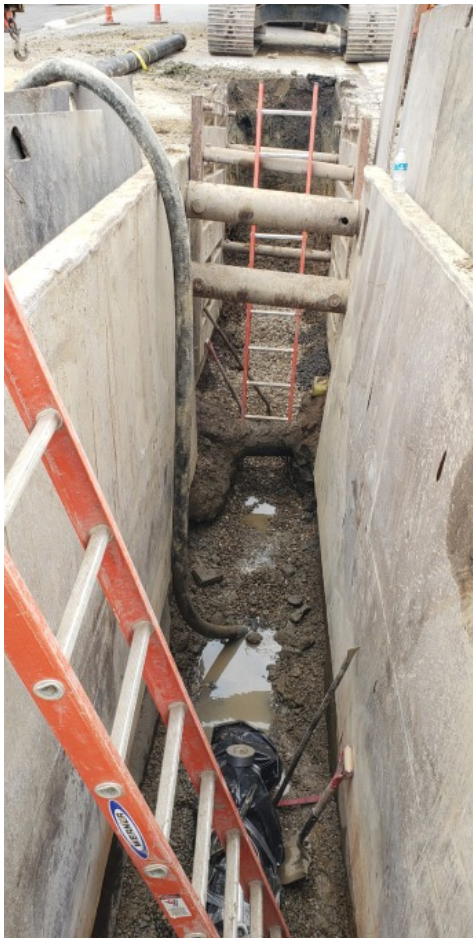
Controlled lifts are critical for achieving compaction.

Industry best practices call for soil/stone backfill to be placed and compacted in controlled lifts, typically about 8 inches thick. The moisture content of the backfill must remain within acceptable limits for proper compaction.

Each lift should be properly compacted before the next layer is added.

This approach requires additional labor and time, but helps achieve uniform material density throughout the trench and reduces the likelihood of future settlement.





Deep utility trenches present significant safety and logistical challenges.

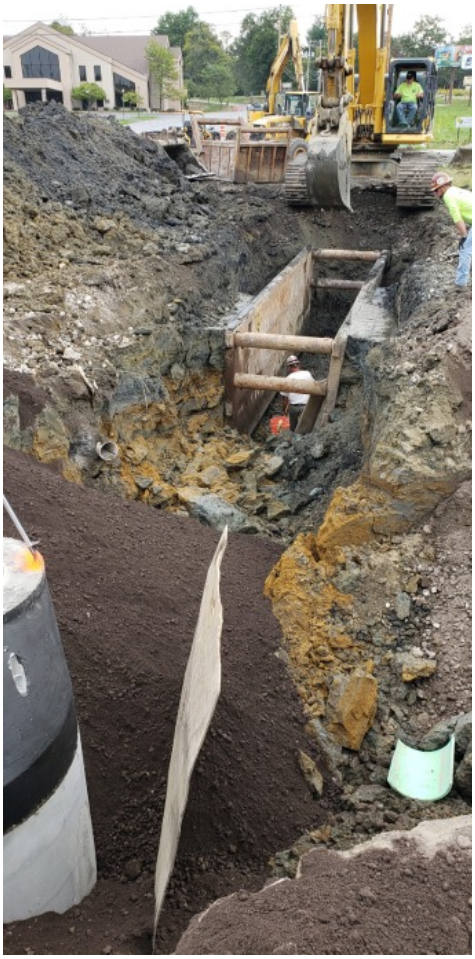
GCI technicians typically use a nuclear density gauge to verify soil/material compaction and moisture content.

However, when trenches require protective trench boxes, safely transporting and operating this specialized equipment deep within the excavation is often impractical due to both equipment handling requirements and safety regulations.

- For safety reasons, technicians climbing a ladder into or out of a trench box must always have three points of contact on the ladder, so there's no way for them to carry the heavy testing gauge into the trench box.
- Certified technicians are the only individuals allowed to touch the nuclear density testing gauge and they must always be in control of the device. Since it can't be lowered into the trench, there's no practical way to get the gauge into a deep trench box.

As a result, technicians may only be able to perform density testing once the backfill has reached a safe elevation below the adjacent ground surface.

Observation is just as important as testing.



Because direct testing isn't always possible throughout the full depth of a trench, independent construction observation becomes an essential quality assurance measure.

Having qualified field representatives onsite allows owners and developers to document that:

- Backfill is being placed in controlled lifts.
- Appropriate compaction equipment is being used.
- Moisture conditions are suitable for compaction.
- Industry-standard procedures are being followed throughout the operation.

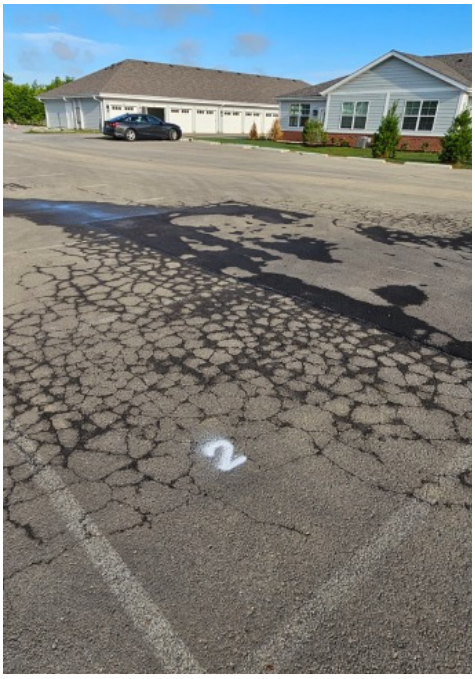
This proactive oversight helps identify concerns before they become expensive post-construction problems.

Settlement can affect utility lines, roadways, and future building lots.

Depending on trench depth, excavation may disturb soils beneath future homes, driveways, sidewalks, and other improvements.

If these disturbed soils are not properly compacted, settlement may eventually affect the stability of structures built above or adjacent to the utility lines.

The same compaction principles apply to parking lots.



Poor compaction isn't limited to utility trenches.

Parking lot failures are frequently traced to inadequate site preparation before paving begins.

When redeveloping an old commercial property or constructing new infrastructure, successful projects begin with:

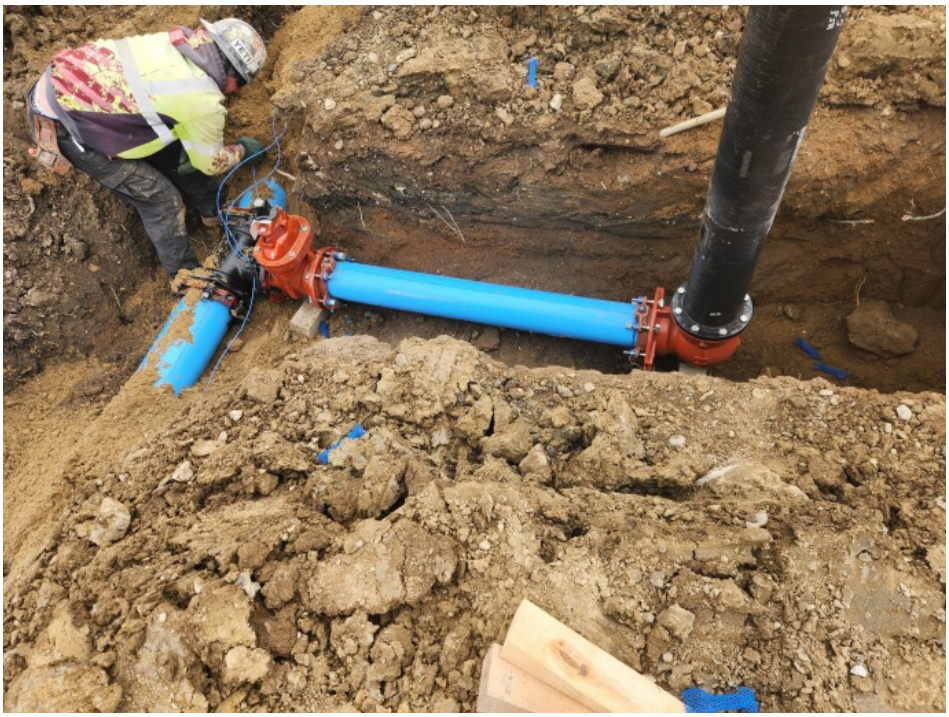
- Complete removal of existing structures and unsuitable materials.
- Returning to stable, undisturbed soils whenever possible.
- Proper compaction in controlled lifts.
- Proof rolling to identify unstable subgrade areas before construction proceeds.
- Verification that project specifications and engineering requirements are achieved.

These quality control measures can improve long-term pavement performance.

How GCI Helps Protect Your Investment

GCI's specialized utility installation monitoring services support public and private infrastructure projects and are available throughout our service area.

Our field representatives serve as independent observers on behalf of owners, developers, municipalities, and contractors to help document quality throughout construction.



Our services include:

- Observation and reporting of new and replacement water and sewer lines, fire lines, lead line replacement, manholes, storm inlets, backflow preventers, and valve or meter pits for privately-owned and municipal utility systems
- Pressure testing for leak detection
- Chlorination testing of water lines
- Bacteria testing
- Observation of construction work near existing pressurized lines
- Observations for boring and directional drilling
- Inventory confirmation and quality check when pipelines and components are delivered to construction sites
- Safety protocol observation for fulfillment of jobsite safety plan, PPE, and traffic safety
- Notifications to impacted utility customers
- Restoration observation of sidewalk, driveway, and roadway patching
- Soil/granular density and compaction testing and concrete testing

To learn more
about utility inspection services, contact:

Tim Petrilla – tpetrilla@gci2000.com | Bob Hiles - bhiles@gci2000.com

Frequently Asked Questions

What is deep trench backfilling?
Deep trench backfilling is the process of placing and compacting soil after installation of underground utilities such as sanitary sewers, storm sewers, or water lines. Because these trenches may be 10 to 30 feet deep, proper backfilling is critical to prevent future settlement and maintain the stability of adjacent roads, parking lots, sidewalks, and building sites.

Why is proper trench compaction so important?
Proper compaction increases the density of the backfill soil. When soil is not adequately compacted, it can settle over time, leading to pavement failures, sinking sidewalks, damaged utilities, foundation movement, and costly repairs.

What are "controlled lifts" in trench backfilling?
Controlled lifts are the industry-standard practice of placing backfill in thin layers—typically about 8 inches at a time—and compacting each layer before adding the next. This method helps create consistent soil density throughout the depth of the trench and reduces the risk of future settlement.

Why can't every layer of a deep trench be tested?
Deep utility trenches often require protective trench boxes to keep workers safe. Because of safety regulations and the size and handling requirements of nuclear density gauges, technicians cannot always access the deepest portions of a trench for direct testing. In these situations, observation of the backfilling process becomes an important part of quality assurance.

How does moisture affect soil compaction?
Every soil type has an optimum moisture content for compaction. Soil that is too wet or too dry may not achieve the required density, even when compacted. During testing, technicians verify that moisture content is within an acceptable range for proper compaction.

What types of projects benefit from utility installation monitoring?
Utility installation monitoring is valuable for residential subdivisions, commercial developments, municipal infrastructure improvements, industrial facilities, roadway projects, and any construction involving new or replacement water, sanitary sewer, storm sewer, or fire suppression lines.

How does GCI help reduce the risk of future settlement?
GCI provides independent construction observation and soil compaction testing throughout utility installation projects. Our field representatives document construction activities, observe compaction procedures, verify testing requirements, and help owners, developers, municipalities, and contractors identify potential issues before they become costly post-construction problems.

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