




 [Youtube.com/CharlotteWater](https://www.youtube.com/CharlotteWater)

 [Twitter.com/CLTWater](https://twitter.com/CLTWater)

 [Facebook.com/CharlotteWater](https://www.facebook.com/CharlotteWater)

 [CLTWaterblog.org](https://www.CLTWaterblog.org)

 Operated by City of Charlotte

[Water & Wastewater Terms](#) page 2

[Project Types](#) page 3

[Before Construction](#) page 6

[Construction](#) page 9

[Restoration](#) page 20

[Visible Structures](#) page 22

[Pipe Materials](#) page 23

This document is intended to provide general information about what to expect during construction. This book is not comprehensive and may not include all equipment or construction situations.

Updated July 2019

Water and Wastewater Terms

WATER

Service Lines are the pipes between the water main under the street and the water meter. Sizes are ¾-inch or 1-inch in diameter at the meter box.

Water Mains (also distribution mains) are the pipes under the street that serve immediate customers and neighborhoods. Sizes range 4 to 12-inch diameter pipe along public streets or appropriate rights-of-way used for distributing water to individual customers.

Transmission Main are the pipes under the street that serve several neighborhoods and zip codes. Sizes range from 16-inches in diameter to 72-inches.

WASTEWATER

Laterals convey wastewater (sewage) from an individual building to a gravity sewer pipe in the road right of way or a Charlotte Water easement.

Manholes are the access points for inspecting and maintaining wastewater pipes.

Low Pressure Sanitary Sewer (LPSS) help push wastewater away from properties near steep and uneven topography (usually near lakes and creeks). Properties with this special need also have special maintenance needs as well.

Trunk receives waste from laterals and conveys wastewater under the street or behind buildings along easements.

Interceptor is a large pipe that gathers wastewater from other trunks or collector pipes to convey to a wastewater treatment plant. Sizes range from 8-inches in diameter to 30-inches.

Relief Sewer is a large pipe to assist existing interceptor when flows are reaching capacity. These pipes help prevent sanitary sewer overflows (SSOs) especially during heavy rain events. Sizes range from 12-inches in diameter to 78-inches.

Force Main & Pump Stations (also known as lift stations) pump neighborhood(s) wastewater from one creek/drainage basin to another through force mains to gravity flow sewer lines so that it can be conveyed to a wastewater treatment plant.

Project Types



96-inch transmission water main valve.

Community Investment Plan or Capital Improvement Plan (CIP)

Projects identified and budgeted through Community Investment Plan. These include projects to serve growing service areas, enhancements at water and wastewater treatment plants and other facilities, and to relin/replace old pipes. Size of equipment and construction zones will vary.



Crews installing new pipe to replace older pipe.

Pipe Replacement

Replacing the water main and/or service pipes (between the water main under the street to the water meter) to reduce future leaks/repairs due to age. Typical construction zone is a few street blocks.



Crew cleaning underground pipe while customers are served with an above ground pipe.

Water Rehabilitation

Crews clean inside of 50+ year old pipe in oldest neighborhoods. A temporary above ground drinking water pipe may be installed. Above ground water pipes serve customers while the water pipe under the street is cleaned and relined with an epoxy solution. All pipes are tested for water quality. Typical construction area is several street blocks.



Crew installing new lining in wastewater pipe.

Wastewater Rehabilitation

Crews clean inside pipe and install a sock-like lining inside an existing pipe through manholes. Think of it as a new pipe inside the old pipe. Construction area may be in street or backyards.



Drinking water installation for a new neighborhood.



Manhole and wastewater pipe installation for apartment complex.

Developer 'Donated' Projects (Installation Development Services, IDS)

Developers install new water and wastewater pipes and then donate to CLTWater. CLTWater inspects pipe installation and tests pipes.



Water pipe extended along street to serve new customers.



Meter and meter box installed for a new customer.

New Service Tap, Street Main Extension

Customers currently on well, septic, or developing a vacant lot can apply for water or wastewater service if it is within 1,000 feet of property. Extending pipe to serve a new customer may take months depending on existing infrastructure location and required permits.

WHAT TO EXPECT BEFORE CONSTRUCTION

Surveying



Survey crews determine the required depth for pipes by calculating the elevations in the area. Stakes, brightly colored flagging, and paint marks may appear in your yard or on the street after a survey crew has worked.

Soil Boring



Subcontractors may conduct subsurface investigations (also known as test pit or soft dig) to assess existing utilities as well as soil and rock conditions along the pipe alignment.

Smoke Testing



Crews may blow smoke into wastewater pipes to identify potential pipe cracks (where smoke escapes). Customers will be notified in advance.

Locates (Spray Painting)



Utilities spray paint where fiber optic, gas, and water pipes to inform contractors before they dig.

Silt Fence



Silt fencing prevents soil /sediment from washing away.

Fencing



Security and privacy fencing may be installed.

Ribbons, Stakes, & Spray Paint



The project area will have various markings along the pipe alignment. Trees may be labeled differently. Please talk to the project manager or inspector to confirm what markings may mean for the project.

Clearing



The easement and temporary construction easement will be cleared of trees (with some exceptions) and restored to grass after pipe installation. CLTWater will preserve trees if possible.

Easement



The easement for a project will vary based on size of pipe, required depth, and other factors.

PIPE DELIVERY AND STORAGE IN EASEMENTS AND ROAD RIGHT-OF-WAYS

Pipe, equipment, soil and other materials are stored in the construction easement or road right-of-way.



24-inch wastewater pipe being delivered to a staging area.



Soil in the road right-of-way.



48-inch drinking water pipe delivered to a construction area.



Manholes in road right-of-way beside construction area.



6-inch cast iron pipe (CIP) at a drinking water replacement project staged beside road.

WHAT CONSTRUCTION LOOKS LIKE

Construction Zone



Construction zones will be large enough for excavators and dump trucks to move.

Asphalt Cutter & Impact Hammer



Equipment used to break or cut asphalt so crews can uncover the pipe.

Trackhoe & Backhoe



Excavators use a bucket on a hinged boom to remove dirt in middle of road for new 36-inch pipe.



Crews using a backhoe at a water pipe rehabilitation project.

Hand Dig Utility Conflicts



Crews may slowly hand dig around pipes, fiber optic, and gas lines to prevent damage or service outages.

Trench Box



Trench boxes protect workers from cave-ins while installing, inspecting, or replacing pipes in the trench.

Inspectors



CLTWater inspectors will verify that pipes are installed according to design and assist customers.

Dump Truck



Several dump trucks may assist with construction to remove and add soil, gravel, etc.

WASTEWATER PIPE CONSTRUCTION

Large Equipment



24-inch wastewater pipe project under a street.

Creek Crossing



Contractors may create a safe creek crossing for equipment. Large pipes keep the creek flowing underneath.

Manholes



Manholes vary in size depending on the amount of wastewater a community creates.



DRINKING WATER PIPE CONSTRUCTION

Valves



Crews may use drinking water valves to temporarily turn off water to a pipe.

Flushing



Crews may flow hydrants to test or maintain water quality.

Meter Box Installation



A new water service installation includes: pipe near the property line, meter, and meter box. The property owner is responsible for connecting plumbing to tailpiece leaving the meter box.

Fire Hydrant



Fire hydrants are installed to provide emergency water service.



24-inch drinking water pipe installation.



72-inch water transmission pipe to serve several neighborhoods.



6-inch drinking water pipe replacement project including new service pipes to each water meter.

WHAT TUNNELLING LOOKS LIKE



Tunneling under a road for a large wastewater project.

CLTWater may tunnel under major roads to reduce lane closures. Tunneling requires entry and exit pits. Tunneling takes several months to complete.



Entry pit to tunnel under a road.

Tunnel Boring Machine (TBM)



Some tunnel boring machines uses disc cutters to fracture rock.



The pipe is installed inside a metal casing to protect the pipe, the street, and other infrastructure above the tunnel.



View from inside the tunnel looking at the entry pit.



Some boring operations may be smaller to go under a large tree or driveway.



Cranes may be required to move equipment and dirt.

WHAT ROCK BLASTING LOOKS LIKE



CLTWater may contact customers to conduct a pre-blast survey to record building details.

A seismograph monitor records blast vibrations to verify they are within safe specifications.

Blasting is a standard construction procedure to remove rock when other methods are not working.

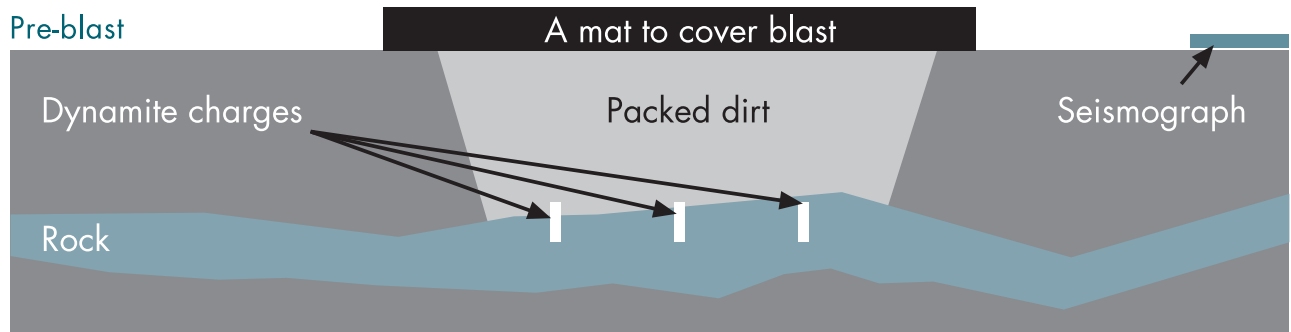
Holes are drilled to insert the dynamite charges into the rock.

Heavy mats (right picture) are placed on the blasting area to prevent flying debris.

Residents may hear a warning horn, a muffled noise, and slight vibration or rumble similar to a slammed door or thunder.



Pre-blast

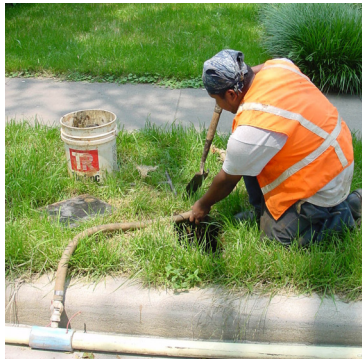


Post-blast



WHAT WATER REHABILITATION LOOKS LIKE

When pipes exceed 50 years of service, CLTWater can extend the use of the pipe through rehabilitation. Crews will clean and add a new interior lining. First the contractor will install a temporary above ground drinking water pipe and test it for quality. Once the above ground pipe is approved, customers are connected.



The above ground pipe will have small ramps or be just under the street for customers to access their driveway and use sidewalks.



Crews dig at strategic locations reducing the amount of lane closures, pavement repair, and inconvenience to customers.





Water pipe rehabilitation involves an innovative technique of cleaning the inside of the existing water pipe. Scrapers (bottom of photo) will be pulled through the pipe to remove mineral deposits.



Crews will inspect the inside of the pipe using a small camera on wheels.



A new protective coating will be sprayed in the pipe to extend the life of the pipe.



A pipe section showing decades of mineral deposits accumulated inside.



A pipe with a fresh interior lining. The pipe is tested for water quality before being put back in service.

WHAT WASTEWATER REHABILITATION LOOKS LIKE

Crews will be on scaffolding installing a sock-like lining inside an existing pipe through manholes. The sock-like liner will extend the wastewater pipe's service life minimizing construction in the area.



Regular diameter pipe rehabilitation project.



Large diameter pipe rehabilitation project.



Manhole Replacement.

WHAT RESTORATION LOOKS LIKE

Yard Restoration



CLTWater will restore most areas with grass seed and straw.

Temporary Road Restoration



Crews may patch the road to reopen and later repave or complete restoration efforts after the pipe installation is complete.

Backfill Tamping with Jumping Jack and Soil Compactor



Devices apply stress to soil causing densification as air is displaced from the pore between soil grains.

Pavement Milling Equipment



Subcontractors or Charlotte Department of Transportation (CDOT) Street Maintenance may repave a larger area than the trench after the project is complete.

One Year Warranty



All construction and restoration by CLTWater contractors includes a one year warranty.

During Construction & After Restoration



In some cases the whole street may be repaved.

VISIBLE STRUCTURES

Water Sampling Station



The purpose is to monitor quality of water within the system.

Auto-Flusher



Auto-flushers are used on dead ends or locations to flow water where water flow isn't optimal to maintain excellent water quality.



Fire Hydrant



Fire hydrants are installed within 1,000 feet of every existing property served by Charlotte Water.



Manholes

Manholes are installed flush with grass if in a maintained yard. If the manhole is installed in a floodplain, it may have a vent coming out of it or may be raised.



PIPE MATERIALS



Concrete (Prestressed Concrete Cylinder Pipe, Concrete Cylinder Pipe, and Reinforced Concrete Pipe) – durable older pipe.



Galvanized – CLTWater is proactively replacing small diameter galvanized pipe before leaks occur due to age.



Cast Iron (CIP) & Ductile Iron (DIP) – frequently used for large transmission and distribution mains. Ductile iron pipe is 95% recycled material.



Brass - CLTWater uses brass connections between meter and pipe under the street.



Polyvinyl Chloride (PVC) – largely used for small pipe projects. Roughly 50% of the drinking water system is pvc pipe. Wastewater pipe may be blue or green.



Vitrified clay pipe (VCP) - Primarily used for gravity-flow sanitary sewer pipes.



High-Density Polyethylene Pipe (HDPE) - HDPE is very resistant to corrosion and flexible. If project is HDPE, expect to see very long pipe sections stretched over several properties.

WHAT TYPE OF PLUMBING DO I HAVE?

Material	Installed	Color	Notes
Lead	1900s -1986	Dull gray, easily scratched surface	Although banned in 1986, installation of lead pipes was very rare in Mecklenburg County.
Copper	1930s-present	Reddish (like a penny) to dark brown or green	Long lifespan, may contain lead-based solder if home is pre-1986
Galvanized Steel	1930s – 1980s	Gray or metallic	May rust internally and externally, limited lifespan
Polyvinyl Chloride (PVC)	1950s-present	White	Doesn't corrode or rust
Polyethylene (PEX)	1990s-present	Many colors (typically red and blue for hot and cold water supply lines)	Flexible to install