July 2023

# FiberTRAX vs. Microtrenching

# Whitepaper

## The Evolution of Cabling Technologies

Installing fiber-optic cable has been conventionally expensive and difficult to achieve. Boring, trenching, and stringing aerially along poles are cost restrictive, and projects can take enormous amounts of time to complete. Many planning steps are needed when choosing to bore or trench. Initial surveys must be completed to determine soil conditions, underground obstructions, existing utilities, and environmental conditions. Often, communities are impacted by widespread road shutdowns and surrounding area utility outages. Aerial installations require large crane trucks with highly skilled lineman to stop at each pole, assuming the poles already exist. If the poles do not exist, then permits must be obtained and each pole must be placed into the ground, increasing costs even further.

Industry experts and installers have developed several techniques to combat the challenges associated with utility installation, each with their own pros and cons. Trenching, boring, Horizontal Directional Drilling, and plowing all focus on installing cables and conduits below the earth's surface, often 24" – 60" underground. Microtrenching was created as a less expensive and less disruptive alternative. While microtrenching could be more cost efficient in certain cases, it is still extremely invasive during installation, causing road closures and potential utility outages for long periods of time. To overcome these issues, TRAXyL created FiberTRAX, a rapid and efficient way to essentially "paint" fiber optic cables along paved surfaces.

## Microtrenching

The hope that Microtrenching would reduce cost and speed up installation time are fading. It still requires utility identification because of the depths that cuts are made through the paved surfaces.[1] The process uses multiple, large pieces of machinery, each with its own construction crews. After the utility markings are complete, a process called potholing is performed where chunks of the asphalt are removed to identify the location of existing utilities.[2] Once utilities have been deconflicted, a machine equipped with a large saw "microtrenches" a segment of the pavement, often near to where the pavement meets the sidewalk. On average, this trench is 2" – 6" wide and 8" – 27" inches deep.[3] During the microtrenching process, a separate vacuum machine follows close behind (or leads with a hose to the

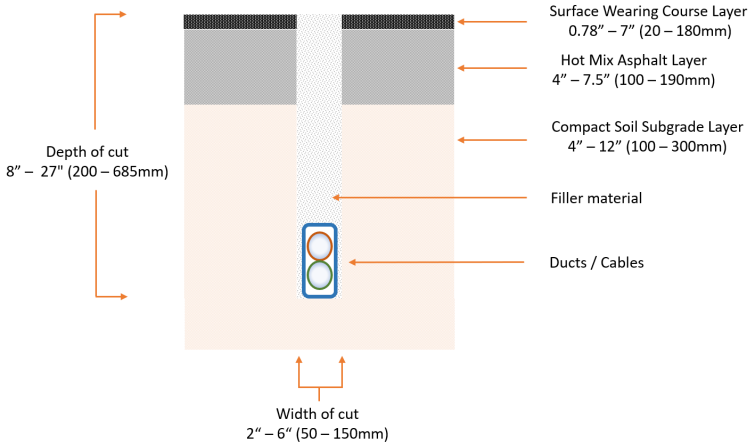


*Figure 1: Diagram of Microtrenching*

[1] Crown Castle YouTube Video: Microtrenching Fiber: A Hosted Walkthrough - YouTube
[2] Fullerton Observer: Fiberoptic Microtrenching Impact on Streets and Infrastructure - Fullerton Observer
[3] Vermeer: Microtrenching 101: Site Planning, Spoil Removal & More (vermeer.com)

microtrench) that gathers the large amounts of debris and spoils generated from cutting through the pavement. Afterwards, installers feed cables into the created trench from starting to ending points. Once the cable or conduit is installed, the open trench is backfilled with hot polymer, elasto-polymer, or grout with a separate machine. These procedures require advanced preparation time, several work crews, and large, loud machines that can require shutting down streets and roads.

A microtrenching team can install about 3,000 feet per day, while other methods max out at approximately 500 feet per day.[4] A typical microtrench can support hundreds to thousands of fiber strands due to the depth and width of the trench. Large fiber counts are great for core and middle mile networks, but unnecessary for last-mile connections.

Not long ago, a town in southern California had a micro-trench installation completed and the community was less than satisfied.[5] Quotes from the Fullerton Observer stated:

> *"The jack hammers are loud, the streets are blocked with work vehicles, and bright lights flood through windows as the workers continue after dark. Residents who have had their streets repaved are dismayed that digging and visible patching is being allowed in the street and that their parkway is trenched in preparation for future service if they should choose to have it installed. There have also been problems with water and other utility lines accidentally cut during the trenching. Small sections of asphalt are removed now to discover the depth of other utilities before trenching."* (Observer 2020)

*Figure 2: Microtrenching work completed in Fullerton, CA. Photo by Fullerton Observer.*

*Figure 3: Microtrenching work in progress in Fullerton, CA. Photo by Fullerton Observer.*

[4] Ting: A faster way to fast fiber internet - microtrenching explained (ting.com)
[5] Fullerton Observer: Fiberoptic Microtrenching Impact on Streets and Infrastructure - Fullerton Observer

Council Member Ahmad Zahra responded to a request for comment saying, *"While the agreement with [the company] installing the new fiberoptic cable was entered prior my time, it is unfortunate that unforeseen engineering issues have manifested during installation. These are very complicated issues both technically and legally, but staff have been proactively working with [the company] to address them."* (Observer 2020)

## FiberTRAX

The FiberTRAX approach flips the idea of trenching on its head. It minimizes the installation depth to near zero while still protecting the fiber cable. This eliminates the need for utility locates, massive construction equipment, and large crew sizes, and the process generates minimal debris. With FiberTRAX, one installation machine, called a TRAXtor, can install fiber cable at an average speed of 1,000 feet per hour, with a two-to-three-person crew. A TRAXtor etches the paved surface, creating a channel 8 to 15mm wide and deep. The minimal debris generated by the small etch is vacuumed by the TRAXtor and can be disposed of in bags (this is unlike microtrenching where debris is disposed of by trucks). All in the same forward motion, a cable is inserted into the channel and a highly durable resin backfills the groove and cable payload to seal the cable into the pavement surface. The protective coating is cured in under an hour, allowing traffic and pedestrians to resume with no impact to operations. FiberTRAX can accommodate from 2 to 96 fibers which is perfect for last-mile and campus like environments (manual intervention may be required to accommodate more than 24 fibers).

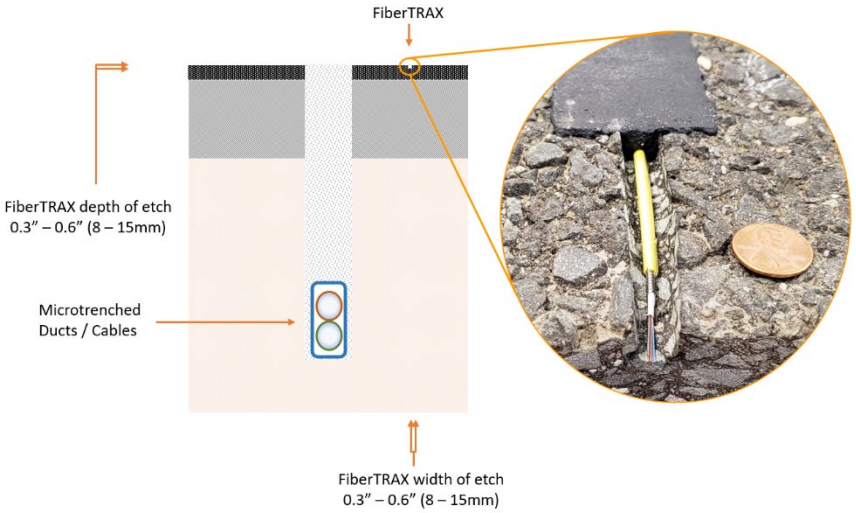


*Figure 2: Diagram of FiberTRAX*

The TRAXtor is the size of a ride-on lawnmower, enabling mobility on the side of roads without any closures. FiberTRAX can also be applied to any paved surface such as sidewalks, walking or bike paths, flightlines, bridges highways and more. By only etching a groove into the surface, FiberTRAX avoids all risks of damaging underground utilities. Without the need to identify utilities, FiberTRAX is the only cable installation technique that can be installed on-demand and on the day of a request. The final product is sleek, clean, and can be installed using a multitude of colors for high-visibility or blended to color-match the surface, making it more visually pleasing to neighborhoods and other aesthetically conscious areas. It is also extremely durable and resistant to extreme weather.

*Figure 3: FiberTRAX installation - Camp Loyaltown in Hunter, NY*

FiberTRAX was recently installed in a remote facility located in Hunter, New York on the Catskill Mountains. The facility required that the fiber installation be finished prior to the

facility opening for the summer, without ruining the aesthetics of the facility. The customer had a limited budget, and the use of large equipment was restricted as most of the camp could only be accessed by small roads.

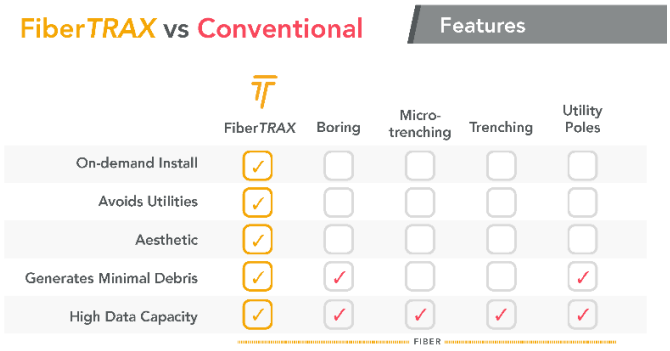


*Figure 4: Features of FiberTRAX*

Conventional installation techniques, including microtrenching were not a viable option because the potential to hit unknown underground utilities was too great, costs were too high, and the schedule for installation was too long. FiberTRAX was the best option to achieve the goals of the facility. FiberTRAX was installed using four TRAXyL employees. The equipment was transported via pick-up truck with attached trailer. Over two days, approximately 1,800 feet of FiberTRAX was installed and a fully operational network was ready weeks before the facility opened for the new campers.

## Summary

FiberTRAX and microtrenching are both options for contractors to utilize when building a cable network. However, FiberTRAX is less invasive, more cost efficient, faster to install, and can be performed on-demand. Microtrenching cuts through multiple layers of pavement, creating an expansion joint where one was never intended. It can cause damage to utilities and paved surfaces due to expansion and contraction of separated layers. Water migration through penetrated layers can also damage the pavement. FiberTRAX etches a shallow channel into the wearing layer only, and never penetrates through the surface. FiberTRAX protects cables and conduits from damage by incasing them in a strong and durable Top Coat. FiberTRAX avoids the pains associated with damaging an unforeseen underground obstacle. Underground locating and bothersome right-of-way closures are no longer a problem with FiberTRAX.

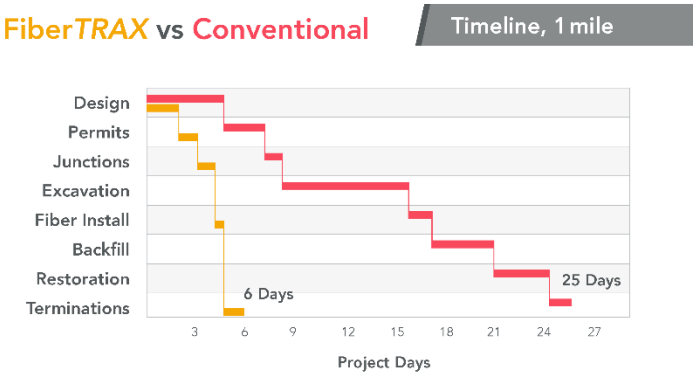


*Figure 5: Notional FiberTRAX vs Conventional timeline*