MicroTrenching

dura·line

What is Micro Trenching?

photos on opposite page

top: FuturePath Flex 6-way install

middle: FuturePath Flex transition from MicroTrench to underground

bottom: With MicroTrenching there are no road closures; cars can drive over the open trench during installation.

MicroTrenching is the placement of reduced diameter MicroDuct pathways into the utility space with reduced impact on the existing infrastructure.

Physically, MicroTrenching can be described as a "saw cut" which can be anywhere from ½" to 3" wide, and up to 24" in depth.

Common Terms: MicroTrench, Saw-cut, Nanotrench

Why do we need MicroTrenching?

The most expensive part of bringing high speed broadband to a new place is the cost of deploying fiber optic cable. The industry has been searching for a way to reduce the construction time, machinery, and labor because across the globe, living without a fiber connection is rapidly leading to a substandard life. Consumers today demand instant data for their personal and professional lives. While the current infrastructure hobbles along meeting most of people's upload and download needs, it definitely will not suffice for a 5G world that promises autonomous cars. Only a cohesive fiber network can carry the amount of data needed for a prosperous future filled with innovation, entrepreneurship, and economic development.

As cities tackle the task of modernizing their underground network to include fiber optic cables, they are realizing average costs of deploying fiber-optic cable is about $27,000 per mile (U.S. DOT's Intelligent Transportation Systems Joint Program Office). And 90 percent of that cost is when the work requires significant excavation of the roadway (Federal Highway Administration). It's expensive to dig up underground utilities! Traditional trenching methods, digging at least a foot-wide hole to accommodate an excavator bucket, have proven to be too pricey to rapidly roll out high speed broadband to each household/business.

However, in the early 2000s, the industry found a way to avoid the bulk of the excavation work by using MicroTrenching. Creating a narrow cut in the ground—just large enough to hold a conduit for fiber—has substantial benefits over traditional trenching, beyond just cost-savings.

With new fiber optic cable upgrades and more cost effective construction techniques, communities are well on their way to getting even smarter than they already are.

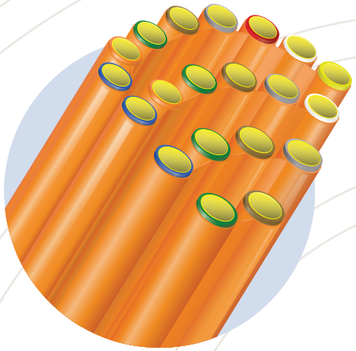
Where can MicroTrenching be used?

- FTTH
- Long haul
- Back haul
- Smart Cities
- DAS antenna installations
- and more!

The MicroTrench placement includes

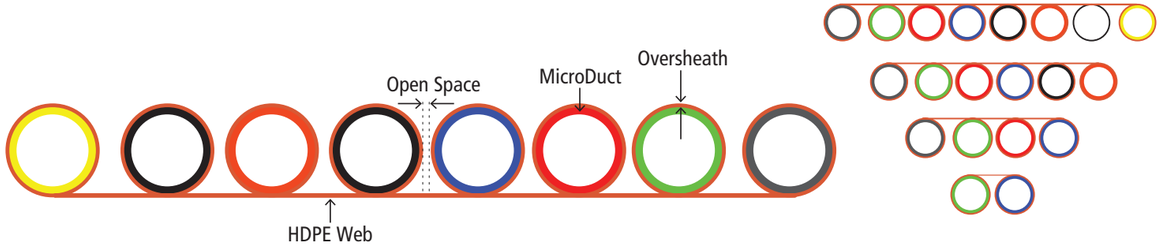
- Curb cuts
- Cross road cuts
- Side walk
- Alley cuts

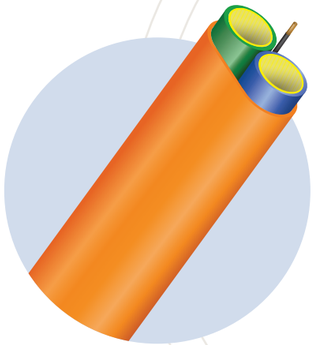
MicroTrenching Products



FuturePath Flex

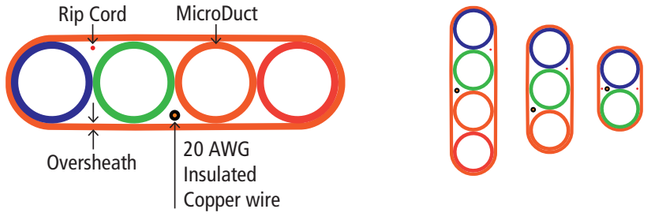
- MicroDucts joined by a thin web of HDPE, allowing for easy separation and routing of individual ducts
- Flat shape allows installation in narrow slits, saw cuts, direct buried (traditional trenching) or horizontally drilled applications
- Can be placed vertically, horizontally, or rolled into a round-shape for vibratory plow or directional drilling
- Configurations: 2-way, 4-way, 6-way, 8-way

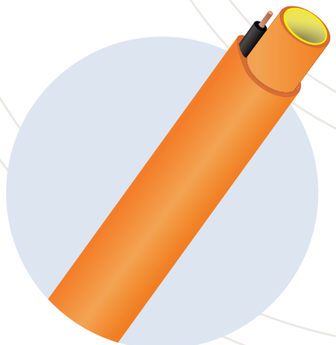




FuturePath

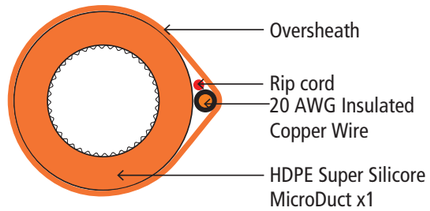
- MicroDucts factory bundled with a polyethylene oversheath
- Multiple pathways for one installation cost and future growth
- No special tools or equipment are required
- Optional 20 gauge locate wire making locates easy and reliable
- Flat configurations: 2-way, 3-way, 4-way





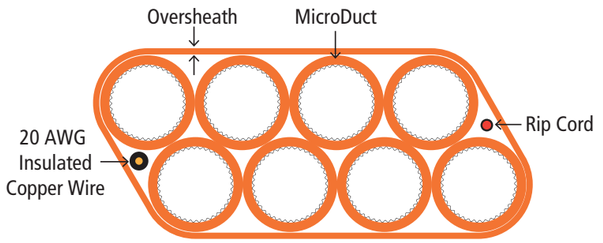
Locatable MicroDuct

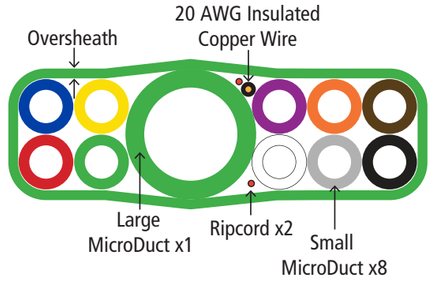
- Used for Fiber Drop Installation
- Ruggedized with over-sheath for harsh conditions
- 1 x 20 AWG Insulated Copper Locate Wire
- Locatable MicroDucts available from 5 mm–27 mm OD



Custom FuturePath

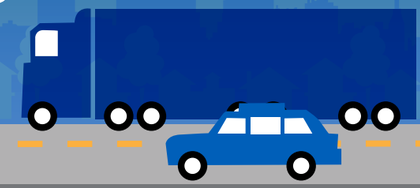
- FuturePath configurations can be created to accommodate specific network requirements and municipal ordinances
- MicroDucts can be bundled in specific shapes to accommodate cable requirements and trench dimensions
- Contact Customer Service for details





Traditional Trenching vs MicroTrenching

Traditional trenches can be several feet wide creating traffic detours for days or weeks at a time

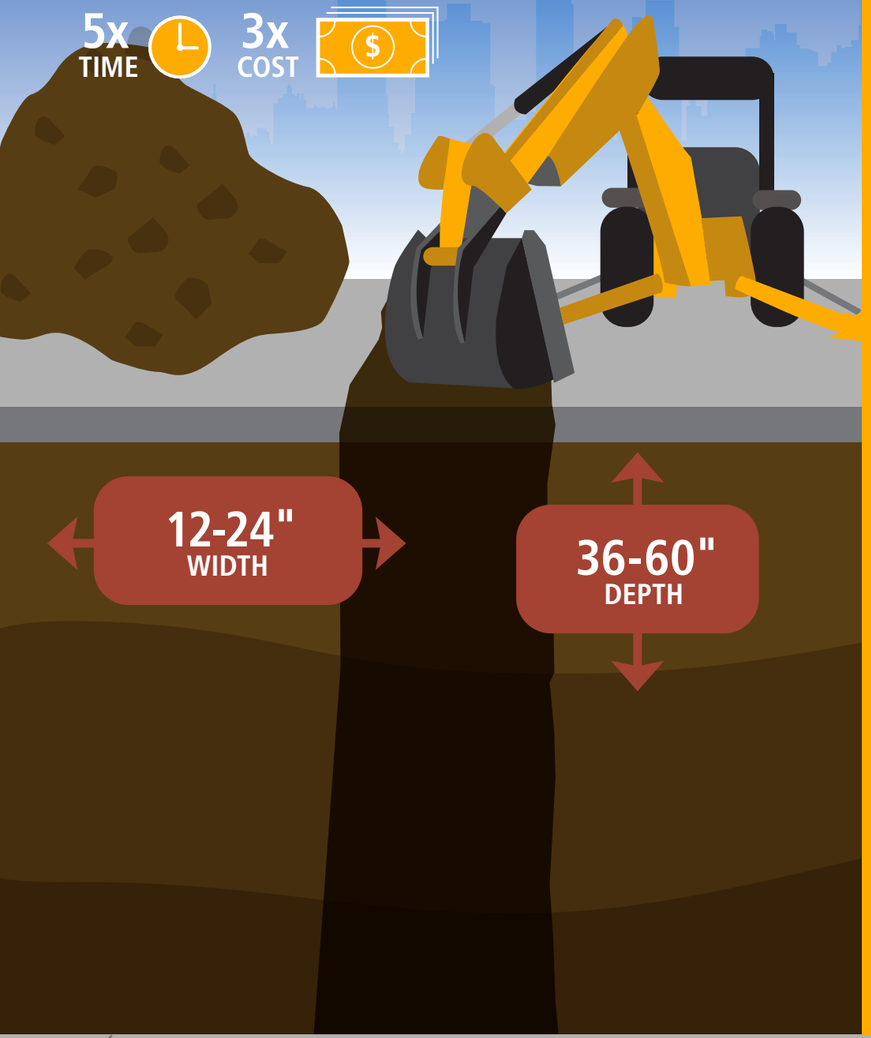


Fewer road closures, can drive over trench during installation

TRADITIONAL CONSTRUCTION

5x TIME

3x COST



12-24" WIDTH

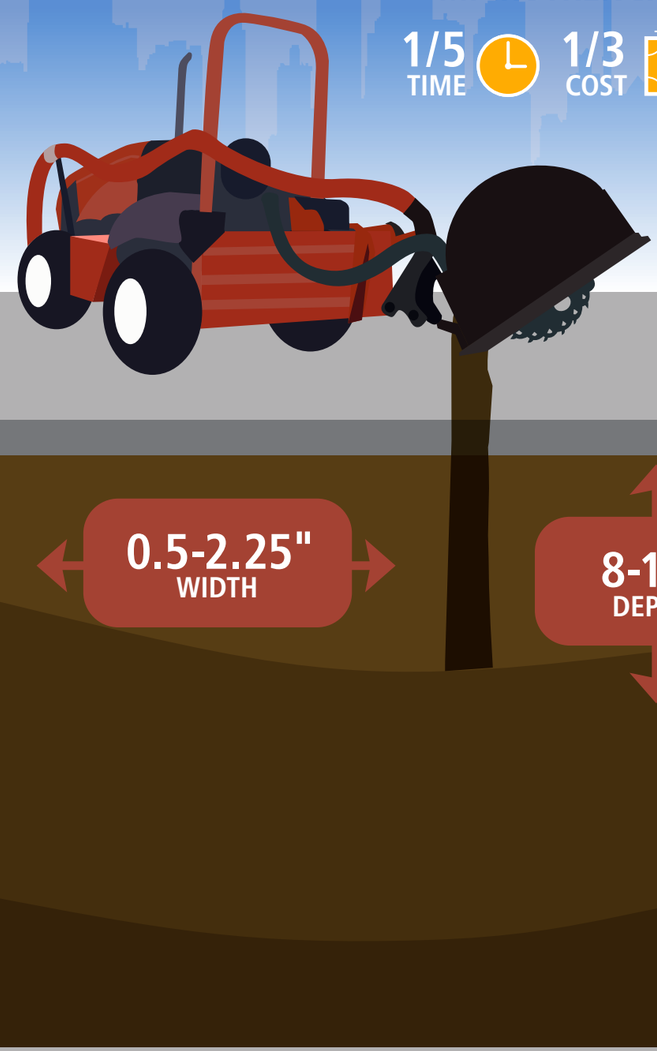
36-60" DEPTH

TRADITIONAL		MICROTRENCHING
160+ DAYS	**PLANNING TO COMPLETION** Open Trench or Directional Boring vs MicroTrenching	50-55 DAYS
	SURVEYING & PERMITTING Usually half the time compared to a traditional trenching project	
	MANPOWER Fewer people needed to manage a smaller work area, less people required for traffic control, and smaller reels that are easier to handle	
	COST MicroTrenching creates a cleaner job site with reduced backfill costs, faster installations, and lower restoration costs	
30+ DAYS	**BUILD TIME**	2 DAYS

MICROTRENCHING

1/5 TIME

1/3 COST



0.5-2.25" WIDTH

8-16" DEPTH

With traditional trenching there is higher risk for hitting existing utilities

MicroTrenching Phases

step 1

Planning Phase

Determine the route, depth, and restoration method. Governing agencies and municipalities may stipulate certain materials or design criteria that should be agreed upon prior to design or beginning any construction. Ensure that all parties agree to a material specification for reinstatement of openings in roadway surfaces.

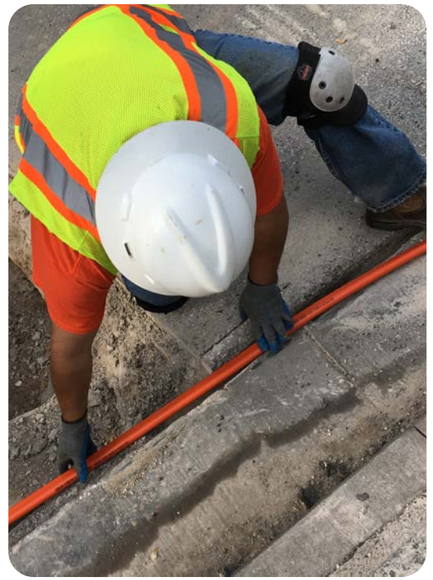
step 2

Trenching Phase

Partner with a reputable equipment supplier and operator if you don't have specific experience with saw cuts or MicroTrenching.

Cut route to predetermined depth and width according to approved plans. Proposed route should be carefully determined, avoiding utilities and obstacles that would require cutting the conduit, keeping the route as straight as possible.

The specially designed saw blade (for cutting into asphalt, concrete or rock), cutting up to 24" in depth and a maximum of 3" wide, is connected to a vacuum truck/trailer, which removes any spoils, dust, or dirt creating a neat and tidy construction site.



step 3

Pathway Phase

Ensure the route is free of debris, then place the MicroDuct into the MicroTrench. Follow the placement with a shovel handle or similar item to push the MicroDuct to the bottom of the trench. If the trench is rocky, placing a layer of clean sand into the trench will help prevent sharp rocks from deforming the MicroDuct over time.

If the route requires a turn, make several gradual cuts, and if possible, undercut the corners so the MicroDuct bend radius is not exceeded and it transitions with a natural bend.

Prior to restoration placement, it's recommended to place a layer of sand or foam backer rod. A one-inch layer of sand or flowable-fill will serve as insulation and can also help anchor the conduit if a liquid reinstatement material is utilized (ex. concrete-type grouts). Sand can also serve as an insulator if hot asphalt is used as the reinstatement material.

If a fluid re-instatement material will be used, such as a flowable grout, it's advisable to anchor the conduit into the trench.

step 4

Restoration Phase

Choosing the re-instatement materials is the most critical consideration with MicroTrenching. Restoration, by definition, is the process of returning something to as near original condition as possible. Poor restoration causes issues like:

- Uneven settling, causing safety hazards to humans and animals
- Potholes in the restored surfaces
- Improper bonding allows water penetration causing undesired soil movement or frost heave

There is a wide variety of reinstatement materials available and each product should be evaluated for the location and environment. Reinstatement materials need to bond to the side of the trench and flex with roadway movement, due to both pressure and temperature fluctuation. Colder climates and high traffic areas require special consideration.

Backfill the trench 2–3" at a time, tamping between each layer to ensure equal pressure on all sides of the conduit. Ensure the backfill utilizes dry soil, or allow time for drying prior to sealing the MicroTrench.

Reinstatement Material Choices

Asphalt

If asphalt is chosen as the restoration material, the conduit needs to be shielded from the hot asphalt mixture during the cooling phase of the asphalt. This can be accomplished by placing a layer of sand, flowable-fill, or a foam backer rod. Special care must be taken to limit the heat transfer from the hot asphalt to the conduit.

Concrete Slurry or Thermo-Setting MMA Resin

Concrete Slurry or Thermo-Setting MMA Resin provides a more aesthetically appealing finish. They include special bonding agents that limit water migration in the trench. In some cases, the trench depth can be reduced with this method when compared to asphalt restoration.

step 5

Fiber Placing Stage

Once the conduit pathway has been placed and the restoration process is complete, the fiber can be installed into the pathway. Typically, the fiber is air-jetted or pushed (short distances) into the pathway.

For more detailed installation information on Micro-Trenching, please request Dura-Line's Technical Bulletin, "Recommended Procedures for Conduit MicroTrenching and Restoration" DCEB-1002.

Product Selection

There are two easy steps to determine the Dura-Line pathway.

First, decide the fiber count needed today. The OD of the fiber cable chosen will determine the optimal fill ratio and MicroDuct size.

Then, choose a configuration to accommodate today's needs and leave empty pathways for future expansion.

If your design has specific requirements, Dura-Line can customize a product to fit your special needs.

MICRODUCT SPECIFICATIONS

OD/ID (MM)	MIN ID (MM/IN)	FIBER CABLE OD RANGE (MM)		OD/ID (MM)	MIN ID (MM/IN)	FIBER CABLE OD RANGE (MM)
27/20	20.7/0.81	10.0-15.0		**14/10**	9.8/0.39	5.0-7.5
22/16	15.5/0.61	8.0-12.0		**12.7/10**	9.8/0.39	5.0-7.5
18/14	13.6/0.54	7.0-10.5		**10/8**	7.9/0.31	4.0-6.0
16/13	12.8/0.50	6.5-9.8		**8.5/6**	5.9/0.23	3.0-4.5
16/12	11.6/0.46	6.0-9.0		**5/3.5**	3.4/0.13	1.8-2.6

See pages 4-5 for product types

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