Efficient Permitting & Microtrenching: Simplifying Underground Construction
A Fiber to the Home Council White Paper
November 2016

1. Executive Summary

There are a variety of permitting and approval processes necessary to build a new fiber-to-the-home (FTTH) network and other advanced broadband networks. Along with permits and approvals related to aerial construction, new providers need permission to deploy infrastructure underground. In most instances, the local government or state department of transportation will control the relevant rights and processes.

Both providers and local governments have an interest in these processes being efficient. Digging up streets can cause disruption in a neighborhood and undue delays impede resident access to new and improved services.

Striking the right balance here can be complex, in part, because providers are constantly developing new technologies that speed deployment. This white paper highlights best practices that any community can use to get its residents ready for new network deployments, whether fiber or otherwise.

We then address one particularly relevant, innovative underground deployment technique: microtrenching. Microtrenching is a process for deploying fiber that cuts thin, shallow channels into pavements, sidewalks, or existing joints, in lieu of wider, deeper trenches or underground bores. In turn, it promises significant benefits over traditional underground trenching and boring, including improved public safety (including by reducing the likelihood of striking gas lines and other more deeply buried sensitive infrastructure) and reduced disruption in public rights of way.

While the practice has been around for many years, permitting processes have not always kept pace with technology. This paper concludes by highlighting ways that industry can ensure microtrenching is accomplished in a safe and effective manner, as well as simple actions cities can take to implement and streamline the microtrenching construction process.

2. Efficient Permitting

Simplifying permitting reduces barriers to entry in deploying new infrastructure by requiring fewer resources to complete permit applications. Process simplification can also reduce time that local governments and broadband providers spend on administrative inefficiencies. In order to streamline the process, we have three recommendations: (i) adopt a standard
electronic application form; (ii) standardize approval conditions; and (iii) provide and maintain local government points of contact.

Adopting a Standard Form with Electronic Submission

By maintaining a standard form, the permit application process can be replicated easily. Maintaining a standard form allows all parties to know in advance what to expect, simplifying the application and approval process. Additionally, allowing for an electronic submission process would facilitate all fiber providers’ ability to easily and efficiently submit applications. These initiatives, in turn, stimulate competition and expedite broadband providers’ ability to bring fiber to your community.

Standardizing Approval Conditions.

By making the conditions objective and consistent, the decision whether to grant or deny a permit can be determined efficiently. Subjective or variable permitting criteria may lead to arbitrary decisionmaking with ultimately a negative impact on the community.

Ideally, all applications for permits should have a guaranteed response deadline – preferably no more than 5 business days.

Providing and Maintaining Dedicated Points of Contact

Having dedicated points of contact saves time and allows communication with your city and State Department of Transportation in a consistent manner. It also ensures that all competitors are receiving consistent guidance, thereby leveling the playing field. Additionally, local governments should allow providers to work with pre-approved, third-party inspection teams to review work in a timely manner. Maintaining such pre-approved, third party inspection teams minimizes the drain on local government resources while ensuring the integrity of the permitting process.

3. Microtrenching

   a. What is Microtrenching?

Microtrenching is a method for deploying fiber that cuts thin, shallow channels into pavements, sidewalks, or existing joints, in lieu of wider, deeper trenches or bores. Microtrenching enables the deployment of underground fiber in trenches that are narrower, shallower, and completed faster than typical open trenches or underground bores. In a Technical Appendix to this paper, we have diagramed common implementations of microtrenching.

Cutting the Trench
Microtrenches are cut with circular saw blades that accommodate a range of trench widths, depths, and surface types. Generally, the width of the trench is between .75 and 1.25 inches wide and 8 to 16 inches deep, though in some locations these dimensions may vary slightly. Trenches can be cut directly into the road surface, in the joint between asphalt and gutter pans, or in the joint between curbs and sidewalks.

**Placing Conduit and Transitions**

The debris from the trenches is contained by a vacuumed blade cover that whisks away dust and reduces cleanup time. Debris is collected in a vacuum tank that precedes the microtrencher. Once a section of trench is completed, the conduit is installed with tracer wire to enable quick and accurate locating and marking of the fiber conduit before future construction. Inevitably, fiber conduit needs to transition from the road to above and underground vaults behind the curb, where it can be routed to homes and businesses. Microtrenching accommodates transitions from the trench line as needed, including the placement of underground vaults and transitions, under curbs and other infrastructure.

**Restoring the Trench**

After fiber conduit has been placed and routed through all necessary transitions, crews can begin to backfill the trench with a flowable fill that meets local standards and specifications. Typically, microtrenches can be backfilled the same day as they are cut. After the backfill has settled in the microtrench, the last few inches of the trench will be filled with a mastic sealant, which bonds to the surrounding material and creates a highly durable, long lasting, watertight seal above the microtrench. The sealant is tamped level to the road surface and color treated to blend in with its surrounding. After drying, the sealant is designed to grind down in the same manner as asphalt during future road maintenance and construction. The latest mastic sealants maintain road infrastructure integrity in heat and cold and have a projected life longer than typical asphalt.

**b. How Microtrenching Promotes Safety and Benefits Governments and Residents**

**Microtrenching Promotes Public Safety By Reducing Utility Hits**

Perhaps one of the greatest threats to public safety when excavating in the public right of way is the potential to strike a gas line, which can cause an explosion. Microtrenching cuts trenches between 8 and 16 inches deep, well above the depth of most gas lines and other sensitive facilities like water and sewer lines, which are often located below 24 inches. Microtrenching therefore has the potential to reduce the risk of hitting existing underground utilities, including gas lines.

**Additional Steps To Promote Public Safety**
For community safety, residents should be notified in advance of construction through door hangers and street signs with construction dates. On the day of construction, traffic can be re-routed for as short a time as possible, with the least possible impact. All work should be done in compliance with State-level “One Call” or “Call Before You Dig” requirements. After setup of construction safety and traffic controls, crews pothole to visually confirm utility depths and locations are not within the trench path.

With no large open trenches, no boring holes, and no machinery left on site, microtrenching poses fewer safety risks to local residents. Further, it requires less time for the entire process to be completed, reducing the time communities are exposed to construction.

Minimizes Damage to Public Property and Road Integrity

With the proper restoration materials, microtrenching can reduce potential damage to roadways due to the thin profile of the trench, and in some cases, improve road integrity where it is spalled. Similarly for sidewalks, the thin profile of microtrenching and use of high quality sealants reduces the need to remove and replace sidewalk panels. In some cases, high quality sealants can improve the integrity and aesthetics of the joint between sidewalk panels.

Reduces Demand on Local Government Resources

For a variety of reasons including faster restoration, lower likelihood of utility hits, and shallower potholing, microtrenching can reduce demands on local government resources over traditional trenching methods. Faster restoration should reduce complaints from local community members regarding the time and extent of disruption to their roadways, as well as reduce demand on city traffic control inspectors. A lower likelihood of utility hits should reduce demands on cities and local utilities to respond and fix utilities. Lastly, shallower potholes means faster confirmation of clear running lines, minimizing time spent on site for city inspectors.

Aesthetics

When microtrenches in the road are restored, the sealant is tamped level to the road surface and has been color treated to blend in with its surrounding. In many instances, microtrenches can be cut in existing road or sidewalk joints, which when restored, blend seamlessly into surroundings.

Cost Effective & Promotes Competition

Microtrenching reduces the cost and increases the velocity of fiber optic network deployment. In addition to connecting residents faster and cheaper, it increases competition among internet providers to expand their services.

c. How Microtrenching Minimizes Disruption
**Less Traffic Disruption and Crew Presence**

Smaller scale equipment, smaller crews, and faster completion of construction reduce disruption to commuters and communities. During roadway microtrenching, only partial lane closure is required, and equipment can be removed at the end of each day of construction. Trenches are typically restored the same day they are cut, allowing traffic to pass over remediated areas immediately following crew demobilization.

**Less Landscape Disruption**

Microtrenching in streets helps avoid disrupting homeowners lawns, landscaping, and trees. The only excavation in soft soil that is required is to place underground vaults, which occurs regardless of deployment method.

**End-to-End Completion in a Day**

The end-to-end microtrenching process can be completed for large sections of roadway in as little as a single day. As a result, traffic flows sooner than traditional trenching and boring, which makes commuters and communities happier. Within as little as two days, a microtrenching crew can be several blocks down the street from where they began, meaning that the community in that area is impacted for less time.

**Comparison with Boring and Open Trenching**

From the viewpoint of a resident, compared to other techniques like open trenching and underground boring, microtrenching presents fewer obstacles to daily life. There are many things that are different about microtrenching when compared to traditional alternatives for underground construction. We have broken down a few key differences in the table below.

<table>
<thead>
<tr>
<th></th>
<th>Microtrench</th>
<th>Roadway Open Trench</th>
<th>Directional Bore</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Construction Time</strong></td>
<td>&lt; 3 days</td>
<td>&gt; 2 weeks</td>
<td>&gt; 5 days</td>
</tr>
<tr>
<td>(estimated per 1000 ft including restoration)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Underground Depth</strong></td>
<td>8”-16”</td>
<td>&gt;24”</td>
<td>&gt;24”</td>
</tr>
<tr>
<td><strong>Lane Closure and Traffic Disturbance</strong></td>
<td>Partial lane, traffic can resume same day following construction</td>
<td>Entire lane, traffic blocked for up to several weeks</td>
<td>Sidewalk traffic blocked for up to several weeks, intermittent roadway closures</td>
</tr>
</tbody>
</table>
### Presence of Construction Equipment

<table>
<thead>
<tr>
<th>Presence of Construction Equipment</th>
<th>Equipment can be removed each day</th>
<th>Equipment must remain on site</th>
<th>Equipment may be required to remain on site</th>
</tr>
</thead>
</table>

### Amount of Construction Equipment

| Amount of Construction Equipment | Small (tractor trencher, vacuum, bore, restoration truck) | Large (multiple excavators, debris trucks, bulldozers, etc.) | Medium (large bore rig, water truck, debris trucks) |

**Pictured below, left to right: Microtrenching, Open Trench, Directional Bore**

### d. Addressing Some Common Myths

**Myth: Microtrenching is not being accepted.**

**Fact:** More than 50 municipalities in North America, including major cities like New York, have already incorporated microtrenching and implemented relevant standards.

**Myth: Microtrench networks are more likely to be damaged.**

**Fact:** Microtrenched networks are subject to the same State-level “One Call” or “Call Before You Dig” regulatory regimes as all other underground facilities. If not already required by state law, cities can require newly installed fiber conduit to be equipped with tracer wire to ensure they are easy to locate. Microtrenched conduits are placed well below the depth of typical roadway resurfacing, which generally removes only the top 2-4 inches of material from the surface during resurfacing.

---

construction. Depths are usually specified by the municipality and microtrenched networks may be installed well below the depth needed for resurfacing. Lastly, because microtrenched conduits are installed shallower than most other facilities, they are easier to relocate if full depth road reclamation work is planned. As a result, Microtrench networks are not more likely to be damaged than networks built using traditional methods of construction.

*Myth: Construction standards are absent and product specifications inadequate.*

*Fact: Firms generally have comprehensive microtrenching construction practices, and many of the construction standards are comparable to those used in traditional underground conduit system.*

e. Policymakers’ Role in Supporting Microtrenching

An efficient permitting process for microtrenching makes it easier for internet service providers to bring more broadband options to more Americans. Reduced invasiveness of construction brings benefit to communities through improved public safety, greater network access, and less disruption during construction. In order to create a more efficient process, your local government can (i) simplify the permitting process (including a standardized electronic application form, standardized approval conditions, and provision of points of contact); (ii) include microtrenching as an approved method of construction; and (iii) if required, adopt legislation expressly approving microtrenching. Introducing legislation that expressly approves the use of microtrenching may not always be necessary, but it can encourage the development of networks in your community.

4. Conclusion

Local governments can improve public safety, minimize disruption in public rights-of-way, and increase competition of broadband and other communications services to residents by adopting an efficient and consistent microtrench permitting process.
Technical Appendix

Running Lines

Asphalt Offset Curb

The offset curb solution utilizes running lines in an asphalt roadway at a permitted offset from the concrete curb or roadway edge. This solution may only be applied to asphalt roads; it cannot be used with concrete road surfaces.
Curb-Asphalt Joint

The curb-asphalt joint solution utilizes a running line that is inside the construction joint; asphalt is placed and rolled up against the curb and gutter. This solution may only be applied to asphalt roads; it cannot be used with concrete road surfaces. A curb-asphalt running line does not come into contact with the curb; rather, it follows the curb line and removes the asphalt along the construction joint adjacent to the curb.
Curb-Sidewalk Joint

The curb-sidewalk joint solution utilizes the expansion joint between the concrete sidewalk and concrete curb. This solution is suitable for high-density urban environments where the running lines in the roadway have already been used or are not permitted. A curb-sidewalk joint running line typically has an associated higher cost and a lower capacity compared to the other microtrenching methods described in this document.

Sealant

A sealant can be used to bond with the asphalt to seal the trench back to a like-new condition. One of the products available for use has an estimated 100 year life expectancy based on testing under simulated conditions at 130 degrees fahrenheit.

Restoration

Specifications for the final condition parameters can be within the same level as the surrounding surface and not to exceed 0.0625” above the surfaces at the center.