ADDENDUM NO. TWO

REQUEST FOR INFORMATION

ENHANCED BROADBAND SERVICES

PROJECT NO. 303-20

CITY OF THORNTON, CO

TO: Prospective Proposing Firms and all others concerned

DATE: November 18, 2020

PURPOSE: To provide additional information and clarification to the RFI documents for the above-referenced Project.

1. The following questions and answers are provided for additional clarification to the RFI.

   Question 1: Is Thornton looking for responses exclusively from CLECs or ILECs in the State of Colorado?

   Answer 1: The City of Thornton (Thornton) is looking at all options to aid in the decision making process, including Vendors from outside of Colorado that can perform work in Colorado.

   Question 2: While the Fiber Map is helpful, can we receive a copy of the City's current Fiber Master Plan?

   Answer 2: Yes. Thornton's Fiber Master Plan has been attached at the end of this document. Vendors are to note that the Master Plan is not a finalized document and is subject to changes based upon the results of this RFI and other Thornton internal discussions and decisions.

   Question 3: Can Thornton expand on point # 14. Would Thornton consider being the network operator for a municipal FTTP network?

   Answer 3: Thornton will look at all options. The purpose of this RFI is to have a better understanding of the marketplace and what options are even available.

   Question 4: Is Thornton looking for a turnkey solution/provider or would Thornton consider multiple providers that provide different services?

   Answer 4: See the answer provided in Answer No. 3.

Question 5: Is all of the current infrastructure underground and does Thornton have vault, splice points and cable storage details?

Answer 5: Current infrastructure is underground and we do have vault and splice points. Current documentation is spread between several departments at this time. Typically, we do have service loops of 50 feet in each vault.

Question 6: What is the current type, manufacturer, and age of the fiber?

Answer 6: Thornton has been installing fiber optic cable for almost ten (10) years. Approximately 22 miles of the fiber loop are new within the last three (3) years. The current standard is single mode fiber manufactured by Corning (Prysmian non-armored).

Question 7: With Monday the 30th being a day after the holiday, will Thornton consider moving the due date?

Answer 7: Yes. The new due date for RFI submissions will be December 1, 2020 by 11:59 P.M. MST.

END OF ADDENDUM NO. TWO

Andrew Miskell Digitally signed by Andrew Miskell
Date: 2020.11.18 10:22:09 -07'00'

Andrew Miskell Date
Senior Purchasing Analyst

JUNE 2, 2020

City of Thornton, Colorado

Fiber Master Plan

Prepared By:

Vantage Point Solutions

VANTAGEPNT.com 605-995-1777
2211 N Minnesota Street Mitchell SD 57301

Table of Contents

Introduction

Vantage Point Solutions (VPS) was contracted to create a Fiber Master Plan for the City of Thornton. The process for generating this Fiber Master Plan included:

- Engaging with City staff
- Reviewing existing maps
- Talking with providers and other technology companies
- Conducting a strategic planning workshop
- Analyzing information and
- Researching information obtained through publicly available sources

This Fiber Master Plan is separated into two main sections. The first part of the Plan provides background on different technologies and capabilities as well as the different types of municipal broadband networks that exist around the Country. The second part of the document details the strategic plan by first discussing City goals and then providing a road map and timeline for implementing solutions.

Please note that for purposes of this Fiber Master Plan, the term broadband is defined by the Federal Communications Commission definition of broadband which is internet service with speeds that reach a minimum of 25mbps downstream and 3mbps upstream (25/3). Practically speaking, the current FCC definition of broadband is far behind what most customers perceive to be adequate for residential use, but this provides a minimum standard of what is considered to be acceptable broadband speeds.

Technology Overview and Municipal Network Background

For background, it is important to understand the different types of network technologies. A full glossary of terms can be found in Appendix A.

Wireline Technologies

Wireline technologies rely on a physical cable for transmission of the communication signal. These cables usually transport an electrical signal on a copper cable or an optical signal on a fiber optic cable. There are three common wireline technologies used by wireline companies today. These are:

- Digital Subscriber Line (DSL) – This wireline technology overlays a broadband signal on existing twisted pair copper cables. Broadband speeds on DSL networks are dependent on the customer's distance from electronics in remote terminals or central offices. Modern DSL technologies can typically provide 1 Mbps to 2 Mbps download speeds, depending upon the quality and size of the copper cable. However, for customers served by copper cable that exceeds 18,000 feet in length, the distortion caused by the capacitance of the cable renders the cable unsuitable for quality voice. Telephone companies have historically provided voice service over twisted pairs of copper cable. Consequently, millions of miles of twisted pair copper cables have been deployed throughout the country. However, most service providers have concluded that DSL is near the end of its useful life and will not be a long-term solution for broadband delivery. Therefore, they have been looking to fiber technology to meet the increasing customer demand.

- Coaxial Cable (DOCSIS) – Coaxial cable can also be used to provide wireline broadband services with typical speeds of 160 Mbps downstream and 120 Mbps upstream that can be shared by a large number of subscribers. Most Cable Television (CATV) providers like Comcast rely on COAX cables. The CATV industry has implemented standards called Data Over Cable Service Interface Specifications (DOCSIS), which defines how the COAX network can be used to deliver broadband services to their customers. It is important to note that the CATV coax networks are shared – meaning a single cable leaving the CATV headend is split many times to serve many customers. Often, a single cable will provide broadband and/or video to hundreds of customers. This architecture worked well for broadcast video services, since it was a "one-to-many" service, but has limitations when delivering services such as broadband, where each customer requires their own unique connection.

- Fiber to the Premises (FTTP) – This wireline technology serves all customers by a fiber optic cable. Most FTTP equipment allows between 70 Mbps and 1 Gbps of broadband to each customer and is capable of serving customers that are more than twelve miles from the central office or electronic field terminal locations.

Wireless Technologies

Wireless technologies transmit the communication signal "over the air" on a radio frequency (RF) carrier. There are four common wireless technologies used by providers today. These are:

- Fifth Generation (5G) – The Third Generation Partnership Program (3GPP) organization is in process of defining the 5G standards, expected circa 2019. Per the GSM Association, 5G will be targeting user throughputs of 10 Gbps peak, a hundred times that of 4G networks. Although inherently a mobile technology, the first wave of 5G will be utilized for the fixed delivery of wireless broadband services. 5G is anticipated to incorporate higher-order spatial diversity (MIMO schemes, beam forming, cell splitting, etc.), self-organizing networks to minimize self-interference and new user interfaces to support the Internet of Things (IoT).

- Fourth Generation (4G) – Utilizes Long Term Evolution (LTE) licensed spectra to provide wireless broadband services, as defined by the 3GPP organization, with duplexing methodology of both time (TD-LTE) and frequency Divisions. Although inherently a mobile technology, today, nearly all terrestrial wireless providers have standardized on Long Term Evolution (LTE) with fixed Customer Premises Equipment (CPE), as the Wireless Metropolitan Area Network (WMAN) broadband technology of choice. All major cellular providers in the U.S. have deployed LTE and continue to expand their LTE footprints.

- Unlicensed Operations – Unlicensed operations on unlicensed spectra can also be used to provide wireless broadband services. Systems operating on unlicensed spectra typically utilize vendor proprietary air interfaces, Institute of Electrical and Electronics Engineers (IEEE) 802.11, or another variant of the IEEE standards. Operations in the unlicensed spectra inherently are utilized for the fixed delivery of wireless broadband services, as the utilization of fixed devices allow for additional deployment efforts to overcome interference inherent within the unlicensed bands.

- Satellite - Satellite-based broadband is not considered a viable broadband alternative due to the high latency which makes it unsuitable for many applications and unable to provide reliable, high-quality voice connectivity.

Some believe that wireless can be a substitute for terrestrial wireline connections that may be too costly to construct. While wireless can be part of the solution and should be considered for deployment in very rural areas – there are considerations that should be taken into consideration.

- Wireless technologies must be replaced every 5-7 years and they can be very costly to maintain.
- Wireless is not suited for growth. For example – since bandwidth is shared among subscribers, available bandwidth per subscriber decreases as density of subscribers or devices increases.
- Available bandwidth decreases as distance of subscriber from access point increases.
- Broadband speeds are more limited. 4G technologies might allow customers to burst up to 10 or 20 Mbps for short periods of time.
- Not well suited for large bandwidth needs and often discouraged by carriers by only allowing a limited amount of data per month.
- Geography and atmospheric conditions can and will impact service delivery for technologies that need to be in sight of each other in order to transmit a signal. Mountains, hills, valleys, buildings, and trees interfere with the propagation of the wireless signal. Some technologies such as LTE can provide non-line-of-site service (NLOS) to some extent, but at significantly reduced throughput compared to direct LOS. These terrain issues and obstacles can mean that some customers cannot receive the broadband signal or that additional towers (and investment) are required.

Wireline vs. Wireless Technology

Both wireless and wireline broadband service providers have benefited from technology advances, but *wireline* technologies have historically been capable of speeds many times faster than the best *wireless* technologies. Fiber optic cable has been used by service providers for more than forty years to build high-speed broadband networks, primarily for long haul transport routes. Over the last ten to fifteen years, fiber has also been used to increase broadband speeds to the customer because no other technology can deliver as much broadband speed. With FTTP,[1] the broadband speed provided is not dependent upon cable length, but electronics, and each new generation of FTTP electronics allows service providers the ability to offer significantly higher broadband speeds over greater distances without having to make significant changes to their outside plant architecture. There is no foreseeable end to the amount of bandwidth that can be provided over fiber cables.

[1] Fiber-to-the-Premises is sometimes referred to as Fiber-to-the-Home (FTTH).

There are many reasons why fiber is the best technology to construct modern network or upgrade existing networks. Fiber is immune to electromagnetic interference, provides the most reliable services, and minimizes operational expenses. Therefore, it delivers the best voice and broadband services available for today and the foreseeable future. Over the last several years, increases in copper prices, advances in technology, and growth in broadband demand have all worked together to make FTTP a more economical wireline technology for providing broadband. Not only is a fiber network less expensive to deploy, maintain, and upgrade than other wireline technologies, but it has superior broadband capabilities, such as being able to offer telecommuting, telemedicine services, and telepresence. All of these factors make it clear that copper is a dying technology in the telecommunications industry. It would be unwise for companies to utilize copper in their network deployments going forward, except in certain very limited situations.

Once fiber infrastructure is in place, service providers are able to increase the broadband by simply upgrading the electronics on the fiber cable, which represents a relatively small portion of the overall fiber network investment. Fiber technology will allow higher speeds to be delivered to customers over time with minimal incremental investment, making it the best technology for meeting future broadband service needs.

The amount of bandwidth per customer is significantly greater for a FTTP network when compared to a wireless network. Using the technologies available today, the bandwidth delivered to a customer can be more than 100 times greater than what is possible over a wireless network under similar conditions. The bandwidth advantage for FTTP will increase significantly in the coming years due to technology advances with the electronics.

Fiber optic cable is the most-costly to construct. However, it is also an enabling technology that allows for growth. A lion's share of the FTTP investment is the placement of the cable facilities, which typically has a 30-year life, compared to the wireless infrastructure, which has a greater portion of the investment associated with faster-depreciating infrastructure. When placement costs are included over a 30-year life, the cost savings for a wireless network are significantly reduced or eliminated.

Municipal Network Model Overview

There are two main types of municipal networks that serve end-users (other than networks built exclusively for internal government use) and they are most commonly referred to as last-mile and middle–mile. For purposes of this discussion, the term network is inclusive of all technologies including fiber and/or wireless.

Last-Mile Network Models

A last-mile network (also known as Fiber-to-the-Premise or FTTP) is one that is designed to provide service directly to homes and businesses in the community. Last-mile networks can also serve government buildings and other community anchor institutions.

Last-mile networks are the most expensive to deploy but can provide the biggest benefit to the community. However, municipal FTTP networks are also more-rare due to the cost it takes to deploy the infrastructure and the need to have an operator/provider who can run and manage the network. For this reason, most of the municipal last-mile networks in existence are in communities that also have a municipal electric utility. This is because the local government (through its municipal utility) already owns utility pole infrastructure that can be leveraged to offset deployment costs. Municipal electric utilities also have operating and billing systems already in place to serve customers. Therefore, they have experience in serving customers and can more easily shift gears to offer a broadband service as a new offering rather than having to create an operational system greenfield.

The other key factor is that last-mile networks usually require a take-rate that is between 40-60%. This means that the network operator needs to obtain 40-60% of the residential subscriptions available in the community in order to recoup the capital investment, make a profit and be sustainable.

Examples of FTTP networks – both those that have a municipal electric utility and those that do not - are provided below. The municipal electric networks are all very similar and so only one example is provided.

Muni Electric FTTP Network Examples	
Longmont, CO	Longmont's "NextLight" is a gigabit fiber network owned and operated by the city and its power utility, Longmont Power & Communications (LPC). In 2013 Longmont supported the network build at a 70% level, approving a $40.3 million bond issuance to cover the startup costs of the Internet service. Even the $40 million price tag would have been significantly higher if not for the existing asset of an 18-mile fiber loop within the City's limits. Longmont has 38,000 premises and 92,000 residents within its approximately 30 square miles. NextLight offers symmetrical gigabit service at $50/month for those who signed up early. This $50 rate is for both the lifetime of the home as well as the owner should he/she move within city limits. Late in 2016 the City voted to increase LPC's budget by $7 million, sourced from the Electric and Broadband Utility Fund balance to hire staff needed to support take rates significantly higher as initially predicted. Current take rates average 53%.

Non-Muni Electric FTTP Network Examples	
Rio Blanco County, CO	Rio Blanco County utilized county funds and Colorado grant funds to construct an FTTP network serving its rural community. The technologies deployed are a mix of fiber and wireless. Rio Blanco is building a fiber to the premises network in its main two population centers (Meeker and Rangley) and a shared fixed wireless solution designed to reach all other addresses. Additionally, Rio Blanco is building middle-mile fiber available for carriers to lease in the county.
Ammon, ID	The City of Ammon Idaho has a very unique model. Ammon has built an open access network that lets multiple private ISPs offer service to customers over city-owned fiber. The City self-funded a portion of the network. However, Ammon is using a model similar to Google Fiber's "Fiberhoods," in which construction happens first in neighborhoods where a majority of residents commit to buying service. Those who opt-in have the option to pay either an upfront fee of $3000 or pay the amount gradually over a 20-year period, excluding an additional utility fee of $16.50 a month. Should a home-owner sell their house prior to the $3000 fee being paid off – it would be the responsibility of the new home-owner to continues those payments. Conversely, should a homeowner move after paying the upfront free – the new homeowner would have the benefit of the network connection without needing to pay the connection fee. This model has been touted as the "model of the future" but it is far from being complete. Success is yet to be determined the fee structure may not be appropriate for many communities.
Fairlawn, OH	The City of Fairlawn established FairlawnGig as a forward-thinking, economic development strategy founded on the belief that business growth, innovation, and community transformation will follow with every connection. The build cost approximately $10 million dollars (paid for by bond) and the City will connect every home and business. The City is not looking to the network to become a profit-making revenue stream. The City felt that FairlawnGig was a necessity for the community at large. The network has a take rate of just over 50% and is looking at expanding to neighboring towns.
Hudson Oaks, TX	The City of Hudson Oaks established a Pupblic-Private Partnership with a local wireless ISP that was interested in becoming a fiber-based service provider. The City invested in the infrastructure and the ISP came on board to run and manage the network.

Middle-Mile Networks

A municipal middle-mile network is typically defined as a network that serves community anchor institutions (i.e. schools, libraries, government buildings, public safety agencies, hospitals, etc.) but does not directly serve homes and businesses. A middle-mile network could either be operated directly by the municipality or outsourced to a network operator.

The purpose of middle-mile networks is generally to build a high fiber count (fiber cables with strand counts of 144 and above) backbone[2] that provides direct lateral connections to key institutions and enables infrastructure assets to be leveraged and leased by others including businesses and private providers. Although, there are middle-mile networks that are built to support internal government needs only (closed network).

Middle-mile networks are much more commonly constructed by municipalities than last-mile networks due to the significantly lower cost of deployment and operations and reduced risk. Middle-mile networks can be a tremendous asset to a community in that it can generate revenue, and provide critical infrastructure needed to support government operations.

Examples of middle-mile networks are provided below.

[2] A backbone is literally the spine of the network. Backbone's are usually built along main corridors and provide transport to and from the hub site where the electronics are located to the connected entity.

Middle-Mile Municipal Network Examples	
Kent County, MD	Kent County, Maryland is a rural county on the Eastern shore of the state. Kent County determined a few years ago that they wanted to invest in middle-mile infrastructure that they could own as an asset. The County decided not to finance the network build through a bond, but rather paid for it entirely out of general funds. The County now has a 110- mile network completed and have made the assets available to be leased and leveraged by others.
City of Centennial, CO	The City of Centennial (107,000 residents) is in the process of building a fiber backbone. The City is self-funding the middle-mile portion of the network build and will own the assets. Centennial has selected Ting to be the FTTP service provider, who is currently taking signups for residential service for $89/month range for symmetrical gigabit speeds. While the network is the property of the City and eventually an "open network," Ting partnerships typically feature an "exclusive right to operate network" term of multiple years. While the build is the responsibility of the respective cities, Ting will lease and light the fiber and provide all equipment and Internet access. Funding the build is a $5.7 million allocation from the general fund. The city council led by the fiber subcommittee looked at this funding as an infrastructure investment removing the expectation that this funding would be directly paid back.
Northwest Colorado Broadband (NWCB); Steamboat Springs, CO	The City of Steamboat Springs teamed with Routt County, Yampa Valley Electric Association, Yampa Valley Hospital, Chamber of Commerce and the Steamboat Springs School System to legally form a nonprofit. The partners supplied some of the capital along with State grant funds to build a middle-mile network through Steamboat Springs. NWCB selected Mammoth Networks as its network operator to manage, operate the network and lease fiber to interested and qualified applicants. NWCB is also talking with the City of Craig and Moffat County about being the Network Operator for a regional network.

Network Ownership Models

There are four basic ownership and operating models for each type of municipal network noted above. These apply to both last-mile and middle-mile networks.

Publicly Owned and Operated Network

This is a municipal network that is almost 100% self-provisioned. In other words, the municipality solely owns, and internally manages and operates the network and may only need to hire a few contractors for things like locates, and installations. Networks that are self-provisioned are most likely to be municipal electric utility broadband networks such as Longmont NextLight because they already have the back-office systems, trucks, and experience to add on a broadband service. However, FairlawnGig in Ohio is a rare example of a greenfield municipal network that is 100% self-provisioned without having an electric utility.

Publicly Owned and Privately Operated Network

In this model, the municipality owns the assets, and provides oversight, but outsources the management and operations to a third-party entity who also provides the services. This is a more common model for municipal networks and is appealing for localities that do not wish to directly become a service provider. An example of this type of operating structure is Hudson Oaks, Texas. The City owns the infrastructure and is leasing access to a local ISP who is serving as the service provider.

Hybrid

Another option is to create a hybrid model that combines one or more of the above options. This includes:

- Public-Private Partnership (PPP)
- Creation of a non-profit or regional entity

A PPP is a legal partnership wherein the partners balance and apportion risk, benefit and control. Recently, more and more municipalities are exploring establishing a PPP for deploying and operating last-mile networks. There are many different types of PPPs and these are more fully explored in Section 7.

Municipalities looking to build a FTTP network often seek to establish a PPP in order to off-set the costs and share the financial risk with a private sector partner. There are also many different types of PPPs. For example, PPPs include but are not limited to the following:

- An investment entity that steps forward to provide funding for the network in exchange for a long-term payback on their investment. This is a traditional PPP. The investment entity usually requires an ownership stake in the assets and sets other conditions such as requiring the municipality to provide a credit backstop to guarantee investments. The municipality generally may or may not need to provide cash contributions. An investment entity is only likely to be drawn to projects that cost a minimum of $15 million dollars. An investment entity also generally works with another partner that is the service provider.

- A partnership wherein both the municipality and provider contribute funding and resources to the project. Both may share in ownership of the assets. One example is that the municipality can invest in and own the middle-mile infrastructure, while the provider invests in and owns the drops from the middle-mile network to the customer premise. However, there are many iterations of this model.

The type of PPP depends on a number of factors, including:

- Whether the provider can make a profit with take rates that justify an investment;
- The sum total amount of financial resources the municipality can provide;
- Whether the municipality is willing to be flexible on asset ownership;
- Whether there is a private-entity that is interested and viable;
- Whether the municipality and private partner can come to agreement on terms and requirements.

Some ISPs would prefer to own their own infrastructure - including the middle-mile backbone in order to control the infrastructure. On the other hand, other ISPs need the municipality to build the middle-mile to offset deployment costs.

Despite the fact that PPPs are widely pursued as options for last-mile municipal broadband networks, a PPP is difficult to establish. This is particularly true in rural areas where the cost of the build is high, and the number of potential customers makes it difficult to justify the investment. This is also true in suburban areas where there are existing incumbent providers with a broad footprint that have a market share of subscribers.

A recent trend by communities interested in exploring PPPs, is for the municipality to issue a Request for Information (RFI) to invite potential interested partners to submit proposals. To date, this has not yet proven to be an effective strategy in the establishment of a PPP.

This is due to a few key reasons. First, there are instances where the RFI itself has created confusion and significant delay in network planning – particularly where the RFI is issued prematurely, is open ended, vague, or includes too many difficult to meet requirements. In some cases, this has resulted in situations where a community has had to re-issue the RFI with

new requirements and/or hold multiple rounds of interviews. Vendors are wary of the RFIs that lead to nowhere. A much more effective strategy is to hold meetings with providers and explore this option before issuing out any RFIs or RFPs to ensure that the solicitations is specific, detailed, targeted and leads to a viable solution.

For networks that may involve more than one municipality or financial contributions that are coming from more than one entity, a good option to consider is to create some kind of joint-authority entity or nonprofit. For example, Northwest Colorado Broadband that was more fully discussed in Section 3 created a nonprofit entity with six founding members that included the City, County, school system, electric association, Chamber of Commerce, and hospital. Several of the partners contributed funding and/or own assets that were part of the project to build a middle-mile network through Steamboat Springs. The founding members serve on the Board of the nonprofit and the nonprofit is responsible for overseeing the network build, and operations. Since the nonprofit does not have any staff, the nonprofit hired a network operator to manage the network and manage the dark fiber leasing and marketing.

The entity may also pursue grants and expand services in the region. By establishing a separate entity such as this, can increase the ability to share resources, share costs and create economies of scale for smaller networks that may better entice network partners. A regional entity could also more easily deploy and manage options for programs including Wi-Fi deployment, smart city applications and dark fiber leasing.

Privately Owned and Operated Network

A more traditional model is an entirely privately owned and operated network. This could include encouraging existing providers to either enter the market as a new provider or working with local providers to expand into areas not previously served. In most cases, tax incentives and other non-cash benefits have not served as a big enough incentive for providers to build into new areas. In most cases, the private provider would most likely as for cash contributions.

Strategic Plan

The City of Thornton is in the process of building a middle-mile fiber network to connect to its traffic system and facilities. In addition, the City has future plans to install fiber in the water system trench as a part of its 72-mile water project extending northwest of Fort Collins, East to Weld County and south of Thornton. The City would like to maximize its current and future fiber network to achieve a long-term goal of providing needed communications infrastructure in the City. Long-term goals are split into two parts – network goals and community goals.

Network Goals include:

- Extending network to include WiFi to Parks for festivals and events and 173 miles of trails (security for events)
- Connecting to facilities along fiber route
- Coordinating with Adams 12 School System for shared resources/reduced fees
- Potentially working with other carriers such as Zayo to reduce reliance on Century Link for connectivity as well as building redundancy into the network
- Address public safety needs such as body cameras
- Connected vehicles and advanced intelligent transportation systems
- Investigating Smart City applications as they develop including:
    - Advanced Meter Reading
    - SCADA improvements
    - Water Monitoring
    - Parking/ other
    - Kiosks that can be placed in common areas that can be customized for community services

Community Goals include:

- Investigating options for bringing enhanced internet services and more competition for residents and businesses
- Creating economic development opportunities including bringing fiber to the industrial and commercial areas such as the N. Washington corridor
- Implementing broadband-friendly policies such as Dig Once Policies and requirements for developers to install conduit and telecommunications facilities in new housing developments while under construction.

Achieving Network Goals Through the City Middle-Mile Network

By continuing to expand the City's middle-mile network, Thornton can achieve its network goals over the next 5-10 years. Middle-mile networks cost less to deploy because they are only designed to create a ring through the community and connect to a selected number of anchor institutions.

The benefits of a middle-mile network are substantial and would enable the City to:

- Deploy critical infrastructure that will serve regional needs for the next 30+ years
- Own a network with an investment cost that is much smaller with a risk much less significant than a last-mile network
- Potentially attract private providers to leverage the network
- Enable the City to phase-in a last-mile solution
- Potentially build fiber to towers to better encourage wireless technology deployment
- Reduce costs for last-mile providers in reaching the underserved areas
- Lease excess fiber and conduit to generate revenue and encourage private provider investments

Another substantial benefit is that the City can monetize the network by making it an open access network. An open access network is one where the infrastructure assets (conduit and/or fiber) are made available under certain policies and procedures to multiple non-network owners.

Monetizing the City Network

Middle-mile networks that lease dark fiber and conduit are designed to be open access. With middle-mile networks – the more users, the bigger the benefit to the network and the more revenue it generates. A private provider that is considering building in a community may have an interest in leasing middle-mile assets because it helps with reducing their costs of deployment. A provider, then, would only need to invest in the lateral connections to homes and businesses and would not have to build the backbone. Larger businesses and those with multiple office locations may also be interested in leasing fiber assets to help connect an internal network or obtain better broadband.

In most cases, excess[3] conduit and fiber deployed can be leased through an agreement called an Indefeasible Right of Use (IRU). IRUs are commonly used in the industry to provide long-term access to assets. The term of an IRU typically runs between 10-20 years.

Conduit Leasing

Conduit is something that is generally (except in extreme circumstances) part of every underground network fiber build. The most expensive part of a deploying a broadband network is the construction. The cost of the actual assets (fiber and conduit) are a tiny portion of the overall budget. Therefore, if engaging in a network build, it is cost-effective to install larger or extra conduit banks and install high-count fiber during the initial construction phase to cover all current and future needs. It is not cost-effective to have to dig more than once.

There are a variety of conduit sizes that can accommodate one or more fiber cables. Often, the network owner will install a larger size conduit than what is needed in order to lease excess space to other providers that want to install fiber. Sometimes a network owner will install multiple conduits side-by-side instead of having one larger conduit bank because some providers prefer to have exclusive rights to a single conduit for security reasons.

Conduit pricing is usually based on a per-foot basis. Pricing varies based on demand in the region and amount of conduit available. Below is a chart that provides examples of three different pricing structures for conduit:

Location	Price	IRU Term	Total Cost
Boulder, Co	$5.50 per foot	20 years	$722,271 in a one-time payment
Lincoln, NE	$65,000 per year	20 years	$1.3 million paid monthly over 20 years with an escalation clause not exceed CPI.
Baltimore, MD	$3.00 per foot (appx)	Negotiable	Depends on how much leased. City requires any new conduit built by provider to be owned by City

Investing in conduit without building a fiber network is actually a strategy that several localities have successfully implemented.

[3] Conduit and fiber strands that will not be used by the municipality.

In 2012, the City of Lincoln invested $700,000 into building an extensive conduit system. Restrictions on municipal broadband prevented them from building a fiber network, so they limited the infrastructure to conduit. The conduit was leased for several years to multiple providers including Level 3 and NebraskaLink. In 2014 the city launched a free Wi-Fi initiative with backhaul provided by NebraskaLink. In 2015, the city announced that the conduit project had attracted Allo Communications, who planned to lease the conduit and undertake a massive FTTP buildout with the goal to serve every home and business in Lincoln. Allo charges competitive pricing with 1 gigabit service costing approximately $90 per month, and 300 Mbps costing approximately $65 per month.

Another example is with an organization called the Atlanta BeltLine. The Beltline is a nonprofit organization that was established to help ignite economic development in an urban area of central Atlanta. The BeltLine owns an old railroad Right-of-Way (ROW) that is a natural loop around the City. The Beltline has been building a conduit system to run under the land around the entire ROW. The BeltLine is moving forward with plans to lease the conduit to interested broadband providers and they have recently hired a company to assist them with the marketing and management of the system.

Dark Fiber Leasing

Dark fiber refers to fiber optic cable that has been installed and is available to use but is not connected to any electronic devices and not transmitting any data. Dark fiber is also referred to as excess capacity. Fiber optic cable comes in strand counts ranging from 12 strands to 1400+ strands. Any strands not in use by the owner (or other entity) are considered dark fiber strands that can leased.

Similar to conduit, dark fiber pricing is subjective and includes but is not limited to the following criteria:

- Availability of dark fiber in the area
- Market rate of other dark fiber in the area (sometimes very difficult to ascertain)
- Number of strands to be leased (minimum of two)
- Amount of footage to be leased (per mile)
- Term of years requested
- Payment up-front versus over time
- Number of strands remaining that may not be marketable (i.e. if an entity only leases a portion of a route, the corresponding strands on the remainder of the route may not be usable. Often providers require the entire route to be leased for this reason.)

Unlike conduit, dark fiber is not based on price per foot but rather based on a per-strand, per mile, per month basis. Prices can range from $5-$750 per pair of strands with a typical IRU term of 10-20 years. Similar to conduit, payments can be made on monthly, annually or on a one-time payment. One-time payments require less administrative work and book keeping. It also provides a large infusion of cash. However, smaller entities may not be able to provide one-time payment and it is difficult to estimate market value over the course of twenty years. Ultimately, all of these considerations are discussed in the negotiating process.

Maintenance can be included in the cost of the IRU or added as an additional fee. Maintenance fees range from about $200-700 per mile, per year. The below chart shows what a rate schedule would look like for a price per pair of strands ranging from $10 - $100 exclusive of any up-front or maintenance fees.

Rate Schedule Based on Flat Fee Per Pair of Strands										
Per Pair	**Per Mile**	**Per month**	**Per Year**	**10 Yrs**	**20 Yrs**	**Per Mile**	**Per month**	**Per Year**	**10 Yrs**	**20 Yrs**
$10	1	$10	$120	$1,200	$2,400	10	$100	$1,200	$12,000	$24,000
$20	1	$20	$240	$2,400	$4,800	10	$200	$2,400	$24,000	$48,000
$30	1	$30	$360	$3,600	$7,200	10	$300	$3,600	$36,000	$72,000
$40	1	$40	$480	$4,800	$9,600	10	$400	$4,800	$48,000	$96,000
$50	1	$50	$600	$6,000	$12,000	10	$500	$6,000	$60,000	$120,000
$60	1	$60	$720	$7,200	$14,400	10	$600	$7,200	$72,000	$144,000
$70	1	$70	$840	$8,400	$16,800	10	$700	$8,400	$84,000	$168,000
$80	1	$80	$960	$9,600	$19,200	10	$800	$9,600	$96,000	$192,000
$90	1	$90	$1,080	$10,800	$21,600	10	$900	$10,800	$108,000	$216,000
$100	1	$100	$1,200	$12,000	$24,000	10	$1,000	$12,000	$120,000	$240,000

When leasing conduit and dark fiber, the owner of the infrastructure must take into account the following considerations:

- A map (GIS ideally) and inventory of all assets leased and available to be leased must be kept current and active. There are several companies that offer cloud-based cutting-edge fiber management software solutions.

- Maintenance of the conduit and the fiber generally falls to the network owner and so the owner must have policies and procedures in place to meet any service level agreements (SLAs) that the lessees have in place. In other words – the network owner must be able to repair fiber cut within an emergency window to prevent downtime outages to the network customers.

- The network owner must have a plan in place for third-party access to the network.

- The network owner must have a process in place for interested third-party applications as well as templates for legal agreements and other documents. A template for a dark fiber lease agreement can be found in Appendix B.

Implementing Network Solutions

Currently the City is at capacity with its ability to manage the City network in-house. In order to implement network solutions and achieve network goals, the City should bring on a network operator that can:

- Manage maintenance and repair of the network
- Monitor network performance
- Implement Service Level Agreement standards
- Manage the dark fiber and conduit leasing program including marketing of the system to businesses and vendors
- Interface with providers including wireless carriers that need fiber to power their wireless systems
- Deploy wireless systems (WiFi) to the parks and trails
- Develop a Carrier Hotel (leasing server space to providers who can then cross-connect with each other)

While the financial impact to the City budget of COVID-19 is yet to be fully revealed, the City may be able to work with a network operator to find creative funding solutions to offset the costs. This includes establishing a revenue share percentage with the network operator based on leasing revenue.

Additionally, the City should also consider issuing a Request for Information (RFI) to vendors regarding smart city applications and Internet of Things (IoT) solutions that the City could implement over the next five years. IoT examples include among other things parking technologies, surveillance, smart lighting and solar solutions, smart kiosks that collect data and can be customized to output wide variety of community information and use drones for everything from public safety to providing media content.

An RFI will both help to inform the City of new technologies and smart city solutions and also provide feedback on network needs. Companies such as Fujitsu work with communities to assess the current City network to ensure that the required infrastructure is in place or will be put in place to support smart city applications. This information will be important to obtain before building out additional fiber. Access to fiber network connectivity is the greatest barrier to IoT.

Finally, the City will also need to contract for a fiber management system. There are many companies out there that provide a variety of software solutions. In the last few years, there have been some excellent developments with cloud-based system that are extremely easy to use and require little training. One company to investigate is Vetro Fiber.

Achieving Community Goals

The COVID-19 pandemic has brought into focus that robust broadband is an essential service. In this pandemic environment, residents must be able to function in the following areas:

- Work from home including frequent use of video conferencing
- Enable students to connect to classrooms and complete schoolwork from home
- Obtain necessary supplies including medicines by shopping online
- Engage in critical telehealth consults with medical personnel
- Connect with family, friends and community in a time of isolation
- Enjoy video entertainment and gaming

A solid broadband connection is required to do any of the above tasks, but families need to perform many of these tasks simultaneously. Lower speed internet services are easily overloaded when students are in a virtual classroom along with a parent on a video meeting. The ability to send data upstream from the home at higher speeds has recently become a focus. Over time, this problem will exponentially grow as more devices and services require a robust broadband connection.

This pandemic is a global disrupter that will fundamentally alter the way we live and work. Some businesses are already planning on staying 100% virtual. What this means is that it is an urgent imperative for communities to have the affordable robust broadband they need to function in a post-pandemic society.

Most Front Range communities like Thornton do have adequate broadband services through local providers. However, the pandemic has created an urgent need for reliable, robust and affordable access to enable the following:

- **Student Learning**. The "Homework Gap" is a term used to describe a situation where students have access to internet at school but not at home due to lack of access or cost. Not only does this impact how teachers utilize

technology in the classroom, but it limits things like distance learning to access programs and learning tools that are not available locally.

- **Economic development**. Simply put, broadband enables a community to attract and retain jobs, increase property value (8% in some communities), recruit workers and increase the overall tax base. Companies that do not have access to high-speed networks are forced to move or pay outrageous sums of money to build their own infrastructure.

- **Telehealth.** Telehealth access has proven to prolong life and enhance quality of life including critical access to specialists. Telehealth enables patients to access specialists and services that do not exist in their community. COVID-19 has made telehealth a critical need but it requires access to broadband.

- **Aging in Place.** More and more older adults are aging in place. The role of technology plays a significant role in the quality of life of older adults enabling them to safely live independently and access everything from telehealth to keeping in contact with family to utilizing Etsy. Many older adults lack internet access due to the cost of the service as well as the lack of knowledge of how to use the technology.

Implementing Community Solutions

Thornton can achieve community goals by working with existing providers on expanding services, bringing in new partners and implementing broadband-friendly policies.

Establishing Partnerships with Providers

The major existing providers in Thornton are Comcast and Century Link. Comcast offers residential speeds and services up to a gigabit while Century Link speeds are well below that in areas that are not new-build where they have placed fiber.

In order to achieve competition amongst the broadband providers, the City should explore establishing a PPP with a new provider. Over the last few years, companies such as Allo and Ting have entered the Colorado market bringing gigabit services to communities. To explore this option, the City should issue a targeted Request for Information (RFI) to understand whether this is a viable option in Thornton. An example of a targeted RFI can be found in **Appendix C**. The City could negotiate certain elements to be part of the PPP including for the provider to:

- Become the middle-mile network operator for the City alleviating the need for the City to work with multiple vendors.
- Providing free drops to nonprofits
- Establishing a local office for drop-in service such as bill paying and equipment return
- Building to all the commercial and industrial centers including the North Washington Corridor at no cost to the business
- Offering low-cost service to qualifying families and older adults

Generally, existing providers do not form “partnerships” with communities above and beyond obligations that are part of cable franchise agreements. However, Comcast does have an excellent program called Internet Essentials that provides a low-cost internet connection for households that qualify due to their participation in federal assistance programs such as free and reduced meals for students. Over the past few years Comcast has expanded the number of federal programs it will accept for qualifications. Given the COVID-19 environment, the City could work with Comcast to help to better market these programs to needy families.

Aside from network providers, the City should also explore establishing partnerships with nonprofits and community groups that can assist with broadband adoption programs to help educate those who have not adopted broadband as a technology. There are groups and programs that address each of the community needs noted above. The City should consider establishing a Broadband Advisory Committee to assist with creating nonprofit broadband adoption programs.

Implementing Broadband-friendly Policies

By itself, broadband friendly policies will do little to improve the broadband environment in a community. However, implemented in concert as a part of a comprehensive solution, it can be an effective way to close the broadband gap in a City. Policies include:

Dig Once Policies that require the placement of conduit/fiber when road construction is occurring. The key to a Dig Once policy is ensuring that it is connected to the City's network plan. Otherwise, the City could end up with pieces of conduit all over the place that are not connected to each other. This also requires close coordination between City departments to effectively execute. The Fiber-to-the-Home Council developed a Dig Smart: Best Practices for Cities and States Adopting Dig Once Policies. This document is included in **Appendix D**

- **New Construction Policy** that require the developer to include a plan for telecommunications infrastructure as a part of the community before it is built. This is essentially the placement of conduit and/or fiber during construction of new streets in the development. This can be done at fraction of the cost (cost of just the materials vs cost of construction at a later point) for the City and would be valuable infrastructure for the City to own. In addition, developers do not always notify broadband providers and cellular carriers of a new development prior to it being built. For obvious reasons, it is much easier for infrastructure to be put in while a community is being built than trying to retrofit it afterwards. The City of Greeley created a Dig Once policy that included a New Construction policy as a part of it. The Greeley Ordinance is attached in **Appendix E**.

- **Streamlining Permitting**. This includes publishing clear permitting requirements, fees and applications on the City website and establishing a single point of contact for the carriers.

- **Establishing a Pilot Grant Program** that would provide subsidies to connect qualifying businesses to a broadband connection. The City could set aside a $25,000 to improve economic development by helping businesses that are too far away from a network and cannot connect to a network due to the cost.

These policies could be developed one by one or the City could consider establishing a Policy Working Group to develop them all at once as a package.

Summary

The Solutions discussed in this section are broken down into short term and long-term plans. A summary chart of action items for the next two years is also provided below.

2-5Yr Plan

- Continue to build out middle-mile network per funding availability
- Implement broadband-friendly policies
- Explore the formation of a PPP
- Connect the N. Washington corridor either directly through the City network or with a PPP

- Contract with a Network Operator to implement network goals (i.e. WiFi to the Parks/trails)
- Develop a plan for Smart City applications with a vendor that specializes in IoT and begin implementing solutions
- Implement community solutions
- Implement Dark Fiber Leasing and Conduit Leasing Program
- Connect to facilities along the middle-mile route

5-10yr Plan

- Complete water project fiber link
- Continue to implement IoT solutions as they develop
- Complete network equipment refreshes as needed
- Complete a new Strategic Plan in Year 9
- Reconsider need for phasing in a municipal network if PPP is not established in Years 2-5

Task	Year	Type of Solution
Issue RFI for PPP Provider	2020	Network and Community. Goal to establish PPP and possibly find a network operator
Issue RFI for Smart City applications	2020	Network and Community
Obtain quotes for a Fiber Management System	2020	Network
Work with Comcast to promote Internet Essentials Program	2020	Community
Streamline Permitting Processes	2021	Policy
Develop and implement a Dig Once Policy that Includes a New Construction Policy	2021	Policy
Establish new network connectivity to reduce reliance on Century Link and improve redundancy	2021	Network. Could be established through a PPP or discussions with other local providers
Issue RFP for Network Operator	2021	Network. This will be needed only if a PPP does not include network operator duties. The Network Operator should implement network goals and solutions.
Develop a Dark Fiber and (empty) Conduit Leasing Program	2021	Network. This is done in conjunction with the network operator
Establish a Broadband Advisory Committee for broadband adoption solutions	2021	Community
Explore establishing a Pilot Grant Program for businesses	2021	Community
Create a New Development Policy and implement	2021	Policy

Appendix A – Glossary

Below are key terms found in this document.

Broadband: The Federal Communications Commission (FCC) currently defines broadband as speeds that reach a minimum of 25 Mbps downstream and 3 Mbps upstream (25/3).

Backbone: A high-fiber count fiber optic mainline that provides connectivity to the internet. Connections to buildings from the backbone are called lateral connections.

Backhaul: In a telecommunications network, the backhaul portion of the network comprises the intermediate links between the core network, or backbone network, and the small subnetworks at the edge of the network.

Conduit: A means by which something is transmitted. The conduit houses the fiber.

Dark Fiber: Refers to fiber optic cable that has been installed and is available to use but is not connected to any electronic devices and not transmitting any data. *Also referred to as excess capacity.*

Fiber-to-the-Premise (FTTP) or Fiber-to-the-Home (FTTH): A last-mile network that connects all buildings (residential, business and government) in a community.

Indefeasible Right of Use (IRU): Commonly used in the industry to provide long-term access to assets. Conduit and fiber deployed is leased through an agreement called an IRU.

Last-Mile Network: Network that provides services directly to homes and businesses in the community.

Middle-Mile Network: Typically defined as a network that serves community anchor institutions (i.e. schools, libraries, government buildings, public safety agencies, hospitals, etc.) but does not directly serve homes and businesses.

Open-Access Network: A network where the infrastructure assets (conduit and fiber) are made available through leases to multiple non-network owners that meet the terms and conditions set.

Public-Private Partnerships (PPPs): A legal partnership created by two or more public and private partners that balances and apportions risk, benefit and control of a last-mile network.

Appendix B – Dark Fiber Lease Template

DARK FIBER
LICENSE AGREEMENT

THIS DARK FIBER LICENSE AGREEMENT ("Agreement") is made and entered into this _____ day of ____ _____, 20____ between (OWNER), and, (LICENSEE), a_____. Owner and Licensee are hereinafter sometimes referred to individually as a "Party" and collectively as "the Parties."

RECITALS

1. OWNER owns a Middle-Mile fiber optic network.

2. The network includes unlit or dark fiber optic facilities that constitute unused capacity in the network that are available to be leased to qualified applicants.

3. Licensee desires to lease certain dark fiber optic facilities within fiber optic network.

4. OWNER is willing to lease dark fiber optic facilities to Licensee, under the terms set forth in this Agreement.

NOW, THEREFORE, in consideration of the benefits flowing to the respective Parties and the covenants set forth herein, it is mutually agreed as follows:

Section 1 - Intent

1.1 The intent of this Agreement is for OWNER to provide Licensee the limited, exclusive use of point-to-point dark fiber optic links consisting of single-mode fiber optic strands (the "Dark Fiber"). The Dark Fiber will be located in overhead installations. OWNER shall perform all maintenance of the Dark Fiber for the term of this Agreement. Licensee will pay OWNER a monthly dark fiber license fee, an annual fiber maintenance fee, and other fees, if any, as set forth in Section 5 of this Agreement.

Section 2 - Definitions

As used in this Agreement, unless the context otherwise requires, the following terms shall have the following meanings:

2.1 *Cable* — shall mean a bundle of single mode fiber optic filaments or strands, installed and owned by OWNER, meeting or exceeding SMF 28 or any other applicable industry standard. A Cable is composed of several "dark" fiber filaments or strands.

2.2 *OWNER* — shall mean_____.

2.3 *Dark Fiber* — shall mean unlit fiber optic strands licensed hereunder to Licensee and transiting over continuous segments of the Network as more specifically described and set forth in Exhibit A. Dark Fiber does not include the transmission of information using such fiber optic strands or access, license to use or conveyance of other equipment that may be necessary to enable transmission of information.

2.4 *Demarcation Point* — shall mean the physical point at which OWNER provides termination of the Dark Fiber segments, as further identified in Section 3 of this Agreement, and at which responsibilities for ownership and maintenance of facilities and equipment are allocated as between OWNER and Licensee.

2.5 *Facilities* — shall mean all OWNER-owned equipment, including: fiber cables, utility poles, conduit, bridge attachments, duct systems, pullboxes, splice closures, support hardware and any and all other ancillary material required for the Project (*i.e*., on OWNER's side of the Demarcation Point). Any electronic equipment required to transport signals on the Dark Fiber licensed to Licensee, and any additional equipment owned by Licensee, are not included as Facilities.

2.6 *Force Majeure* — shall mean any event or cause beyond the reasonable control of OWNER and/or Licensee, that cannot be prevented or eliminated by the exercise of prudent utility practices, including, but not limited to, acts of God, strike, lockout or other labor dispute, sabotage, fire, storm, lightning, flood, war, riot or insurrection, explosion, accident, vehicular collision, embargo, blockage, acts of civil disobedience, inability to secure supplies, governmental authorization or permit, or any other cause whether of the kind specifically enumerated, which prevents OWNER and/or Licensee from performing all or any part of any material obligation under the terms of this Agreement.

2.7 *Maintenance* — shall mean only work which must be performed upon or to the Facilities, to ensure the continuity of an acceptable signal (in conformance with the manufacturer's specifications) being transmitted through the fibers, or to ensure the safety and reliability of the Facilities. Maintenance shall not include any work associated with any equipment owned by the Licensee or equipment that sends, receives, interprets, or modifies a signal or signal data.

2.8 *Network* — shall mean the fiber optic cable and support facilities, to include any existing, newly installed, or future installed utility poles, conduit, duct system or fiber optic cable, owned by OWNER and through which data may be transmitted and/or received.

2.9 *Outage* — shall mean the interruption of Dark Fiber continuity or a material degradation in performance of the Dark Fiber when such interruption is the result of physical damage, severance, or other failure of the Dark Fiber.

2.9 *Premises Entry* — shall mean a location within a building owned or controlled by Licensee, at which the Dark Fiber is requested to transit or, in the case of a Demarcation Point, to terminate to Licensee-owned and -controlled equipment and facilities.

2.11 *Project* — shall mean the work processes required for OWNER to complete all requirements of this Agreement.

2.12 *Project Completion* — shall occur at such time that OWNER provides notice to Licensee, along with test results, that the Dark Fiber meets the manufacturer's specifications and all of the terminations have been completed in OWNER's equipment.

2.13 *Service* — shall mean the obligations of OWNER as set forth within this Agreement.

Section 3 - Scope of Agreement

3.1 *Facility Installation*. OWNER has installed, or will cause to be installed, Facilities between the Demarcation Points described and set forth in Exhibit A sufficient to provide Licensee the Dark Fiber.

3.2 *Ownership.*

3.2.1 OWNER shall own the entire Project Facilities including outer and inner jackets, all fiber tubes, and all of the fiber filaments contained therein. All Service equipment required in connection with Service on the Licensee's side of the Demarcation Point which may affect performance of the Service shall be furnished, installed, owned and maintained by the Licensee, consistent with OWNER's network requirements.

3.2.2 *Rights in the Network*. Licensee shall not acquire any interest in the Network or the Facilities by virtue of this Agreement except the limited, exclusive right to use the specified licensed Dark Fibers pursuant to this Agreement. Licensee shall not use this Agreement to challenge, contest or otherwise impair OWNER's ownership of the Network and/or the Facilities.

3.3 *Maintenance*.

3.3.1 OWNER shall perform industry required maintenance, locates and repairs on the Facilities to ensure proper protection and functioning of the Dark Fiber. All maintenance on the Facilities shall be performed by OWNER at OWNER's sole expense. When conducting maintenance on the Facilities, OWNER shall exercise reasonable care to prevent an Outage. Except as otherwise provided in Section 3.3.2 below, OWNER shall not, however, be liable to Licensee for an Outage unless such Outage arises from the gross negligence or willful misconduct of OWNER or its employees, agents, or representatives. OWNER agrees to provide Licensee not less than seven (7) calendar days' prior written notice of any scheduled maintenance or repairs that may result in an Outage. Notification shall be made as set forth in Section 11 herein. Licensee, at Licensee's sole cost and expense, shall have the right to supervise any and all maintenance and repairs on the Facilities.

3.3.2 *Emergency Maintenance and Outages*. In the event of an Outage, Licensee shall notify OWNER of the trouble condition. Licensee will make reasonable effort to establish the trouble condition resides in the Dark Fiber and not associated with Licensee's network electronics. OWNER shall expeditiously perform emergency maintenance and restoration of service as soon as reasonably possible after OWNER learns or is notified by Licensee that an Outage exists. In the event an Outage lasts longer than three (3) days, Licensee may, at its sole discretion, exercise one or both of the following; (i) correct any damages and other deficiencies related to the Outage, at Licensee's sole cost and expense, or (ii) notwithstanding anything to the contrary contained herein, within the next thirty (30) days, terminate this Agreement with notice to OWNER, and be relieved of all further obligation under the Agreement, and receive a refund for the portion of the Fiber Maintenance Fee attributable to the period beyond the termination date.

3.3.3 *Maintenance of Licensee Equipment*. Maintenance on equipment owned by the Licensee, including but not limited to electronic equipment required to activate the Dark Fiber, shall be performed by Licensee at Licensee's own expense.

3.4 *Premises Entries*.

3.4.1 In the course of its deployment of fiber optic cables serving Licensee, OWNER reserves the right to install additional fibers and associated infrastructure beyond that required for Services to Licensee.

3.5 *Testing and Acceptance*

3.5.1 OWNER shall test the completed Dark Fiber to ensure it performs in accordance with the manufacturer's specifications. Upon delivery of test results by OWNER to Licensee, Licensee shall have ten (10) business days to conduct verification tests. Licensee shall notify OWNER of any performance deficiencies found in the Dark Fiber and OWNER shall correct such deficiencies expeditiously. Licensee may refuse to accept the Dark Fiber and

terminate this Agreement in the event OWNER fails to correct said deficiencies within thirty (30) days of receipt of Licensee's notice. In the event of such termination, Licensee shall have no further duties or obligations hereunder, and shall promptly receive a full refund of all fees paid to OWNER hereunder. Dark Fiber is deemed accepted if Licensee fails to accept Dark Fiber or report deficiencies within the verification period. The date of acceptance shall be termed the "Acceptance Date".

3.6 *Use of and Access to Dark Fiber*

3.6.1 In the event a Demarcation Point or any portion of Dark Fiber is located within a building or on private property, OWNER shall be responsible for securing access rights, distribution agreements, easements, letters of authorization, collocation rights, or such similar document(s) as may be required by the property owner and/or tenant/occupant authorizing the presence of the Dark Fiber.

3.6.2 Licensee may interconnect its fiber optic cable network to the Dark Fiber at existing splice cases or other locations as may be mutually agreed to between the Parties. Any work required for said interconnections, including splicing of the Dark Fiber, shall be performed by OWNER at Licensee's sole cost and expense. Licensee shall provide at least fourteen (14) days' advanced notice to OWNER to allow scheduling of interconnection work tasks.

3.6.3 Licensee shall be entitled to enter the manholes and other access points to OWNER's Network (collectively the "Manholes") to service, inspect, maintain and to perform work only on the Licensee owned fiber optic cable and Licensee owned facilities within Manholes.

Section 4 - Term and Termination

4.1 *Term*. This Agreement shall be in full force and effective as of the date that all Parties have executed it, and unless sooner terminated in accordance with its terms, shall remain in effect for five (5) years following the Acceptance Date (the "Initial Term"). If the Licensee is not in breach of any of its obligations under this Agreement which continue beyond any applicable cure period, the Licensee may renew this Agreement for three (3) additional periods of five (5) years each (each a "Renewal Term"). The Licensee shall exercise its option to renew by providing written notice of renewal to OWNER not more than one hundred and eighty (180) days and not less than thirty (30) days before the expiration date of the Initial Term or the Renewal Term. Each Renewal Term shall be subject to the terms and conditions of this Agreement. The Initial Term and Renewal Term shall be referred to collectively as "Term".

4.2 *Termination within the Initial Term*.

4.2.1 Each Party shall have the right to terminate this Agreement upon thirty (30) days' prior written notice if the other Party defaults in its material obligations and fails to cure such default identified in said notice within the thirty-day (30-day) period, or, if the default is not capable of being cured within the thirty day (30-day) period, the other Party fails to begin cure of the default promptly and does not complete the cure within a reasonable period not to exceed one hundred twenty (120) days from the date of the initial notice of default.

4.2.2 OWNER shall have the right to terminate immediately this Agreement if Licensee notifies OWNER of its desire to withdraw from this Agreement before the expiration of the Initial Term, provided OWNER is not in breach of the Agreement at the time such notice is provided. In such event, OWNER shall have and retain all lawful rights and remedies against Licensee, including equitable remedies.

4.2.3 Termination without cause by Licensee shall not relieve Licensee of its obligation to pay all license fees specified in Section 5 herein due through the Initial Term.

4.2.4 Notwithstanding anything to the contrary contained herein, Licensee may terminate this Agreement for convenience any time prior to accepting the Dark Fiber, and except for the Service Connection Fee, if any, shall have no further duties or obligations hereunder.

4.3 *Termination after the Initial Term*. At any time during any Renewal Term, either Party may terminate this Agreement without cause by giving one-hundred eighty (180) days' written notice, or upon such shorter notice as may be mutually agreed-upon in writing by the Parties.

4.4 *Rights upon termination*. All rights to Dark Fiber and Services shall immediately revert to OWNER in the event this Agreement is terminated for any reason. All materials and equipment on OWNER's side of the Demarcation Point shall remain the property of OWNER at all times.

Section 5 - Payment and Billing

5.1 *Service Connection Fee*. Licensee shall be responsible for the cost of all construction required to connect or otherwise extend the Network to the specified Demarcation Point(s), if required.

5.2 *Dark Fiber License Fee*. Beginning on the Acceptance Date, Licensee shall be assessed and shall pay OWNER a monthly license fee for use of Dark Fiber, as previously quoted to Licensee by OWNER and set forth in Exhibit A.

5.3 *Fiber Maintenance Fee*. Beginning on the Acceptance Date, Licensee shall be assessed and shall pay OWNER an annual fee for maintenance of Dark Fiber by OWNER, as set forth in Exhibit A

5.4 *Invoice and Payment*. Invoices for the Dark Fiber License Fee shall be presented to Licensee within thirty (30) days after the Acceptance Date. Invoice for the Fiber Maintenance Fee, shall be invoiced promptly after the Acceptance Date. Licensee shall remit payments required under this Agreement within thirty (30) days of receipt of invoice.

5.5 *Payment Address:* Unless OWNER provides written notice to Licensee of a new payment address, Licensee shall send all payments made under this Agreement to:

_____
_____
_____

5.6 *Payment Disputes*. If a portion of any invoice is disputed, the undisputed amount shall be payable when due. Upon resolution of any billing dispute and determination of the correct amount that is due, the remainder, if any, shall become due and payable within thirty (30) days. If within a reasonable period of time not to exceed sixty (60) days from the date of the disputed invoice, the Parties cannot determine or agree upon the correct amount of the disputed charge, either Party may exercise all remedies available at law or equity.

Section 6 - Force Majeure

6.1 If, because of a Force Majeure event, either Party is unable in whole or in part to carry out any of its material obligations under this Agreement (the "Restricted Party") and promptly gives notice to the other Party of such Force

Majeure, then the material obligations of Restricted Party shall be suspended to the extent and for the period made reasonably necessary by such Force Majeure; provided however, that the Restricted Party proceeds with all reasonable dispatch and employs such diligence as is reasonably necessary to remedy the event causing such Force Majeure. If the circumstances of the Force Majeure prevent Licensee from using the Dark Fiber for its intended purpose, a prorated credit for the Dark Fiber License Fee and the Fiber Maintenance Fee shall be due the Licensee for the duration of the event. Should the condition of Force Majeure continue for a period of thirty (30) days following notice by the Restricted Party of the event, then the other Party, upon thirty (30) days' written notice to the Restricted Party, may terminate this Agreement without liability to Restricted Party.

Section 7 - Limitation of Remedies.

7.1 Notwithstanding anything in this Agreement to the contrary, neither Party shall have any liability to the other Party, whether based on contract, warranty, tort, strict liability, contribution, indemnity or otherwise, for indirect, incidental, consequential, special, exemplary, or punitive damages of any other kind or nature whatsoever, resulting from the performance, nonperformance or breach of this Agreement. OWNER makes no warranty express or implied regarding the quality of the signal transmitted by Licensee over the licensed Dark Fiber.

Section 8 – Miscellaneous Provisions

8.1 *Binding Effect*. This Agreement shall be binding upon and shall inure to the benefit of the Parties hereto, and their respective successors and permitted assigns. For these purposes, the term "successor" shall include, without limitation, any entity or other person to whom OWNER transfers its fiber communication operations.

8.2 *Assignment*. OWNER reserves the right upon thirty (30) days written notification to Licensee to transfer this Agreement, and/or management thereof to a third-party vendor selected by OWNER to serve as OWNER's agent in the management of dark fiber strands available on OWNER network to be leased. Licensee shall not assign this Agreement without the prior written consent of the other Party, which consent shall not be unreasonably withheld.

8.3 *Entire Agreement*. This Agreement contains a complete statement of all of the arrangements and understandings between the Parties with respect to the subject matter hereof. There are no representations, agreements, arrangements or understandings, oral or written, between the Parties relating to the subject matter of this Agreement that are not fully expressed in this Agreement. Any modifications to this Agreement shall be in writing and executed in the same manner as this Agreement.

8.5 *Headings*. The paragraph headings appearing in this Agreement are for convenience only and shall not affect the meaning or interpretation of the Agreement.

8.6 *Waiver*. The waiver by either Party of any default by the other Party hereunder, or the failure of either Party to, at any time, require strict compliance with any of the terms and conditions of this Agreement, shall not be deemed a waiver by such party of any default of the other or a waiver by any such Party of its right to strict compliance by the other Party.

8.7 *Severability*. If any provision of this Agreement is found contrary to law or unenforceable by any court, the remaining provisions shall be severable and enforceable in accordance with their terms, unless such unlawful or unenforceable provision is material to the transactions contemplated hereby, in which case the Parties agree to replace such unlawful or unenforceable provision with a valid and enforceable provision that will achieve, to the extent possible, the economic, business, and other purposes of the unlawful or unenforceable provision.

8.8 *Venue*. This Agreement shall be governed by and construed in accordance with the laws of the State of Maryland, without reference to that State's choice or law or conflict of laws rules. Should suit be filed for any reason arising out of this Agreement, the Parties agree that venue for such action shall lie only in the State courts of competent jurisdiction sitting Maryland, but, as to the federal court, only in the event of a claim involving a question of the interpretation or enforcement of rights or obligations, if any, arising under a federal statute or regulation. This subsection shall survive the termination of this Agreement for any reason.

8.9 *Attorney's Fees*. The parties expressly agree that each Party will bear its own attorney's fees and court costs incurred in connection with this Agreement.

8.10 *Remove/Relocate Network*. OWNER shall have the power at any time to remove or relocate any portion of the Network, including any pole, conduit, wire, cable or structure that is unnecessarily dangerous to life or property, without incurring any liability for such removal or relocation. In the event such removal or relocation becomes necessary, OWNER shall take all commercially reasonable efforts to minimize the impact on Licensee.

8.11 *Emergency or Disaster*. If at any time, in case of emergency or disaster, it shall become necessary in the reasonable judgment of OWNER to cut or move any of the Network OWNER shall have the right to do so without incurring any liability, provided, however, that OWNER shall restore any portion of the Network that has been cut or removed as soon as commercially practicable and provided that Licensee shall be relieved of any duty to pay any fees otherwise required under this Agreement for any period during which the licensed Facilities are unusable. Additionally, Licensee shall have the rights specified in Section 3.3.2 in the event such emergency or disaster results in an Outage.

8.12 *Network Abandonment*. If OWNER desires at any time to abandon any affected portion of the Network in the Project, and such abandonment shall make the licensed Facilities unusable, it shall give Licensee notice in writing to that effect promptly after it has made a determination to abandon any such Facilities, but in no event less than one hundred and eighty (180) days prior to the date on which it intends to abandon such Facility. If agreed to by both Parties, and the Licensee has need for such Facilities to remain in place, OWNER may, at its sole discretion, transfer ownership of the Facilities to the Licensee for a mutually agreed cost, and the Licensee shall save harmless OWNER of such Facilities from obligation, liability, damages, costs, expenses or charges incurred thereafter. It is not the intent of this provision to place an obligation upon OWNER to transfer/sell abandoned Facilities to the Licensee.

8.13 *Fair Market Value for Services*. The Parties acknowledge and agree that the fees and charges described in this Agreement represent the fair market value for the goods or services being licensed or rendered to Licensee by OWNER hereunder and have been bargained for by arm's-length bargaining.

Section 9 – Further Limitations

9.1 *Sole Use*. The specified licensed Dark Fibers shall be for the sole use of the Licensee and may neither be resold, sub-licensed, marketed nor otherwise conveyed by the Licensee to any unaffiliated third party or entity.

Section 10 – Special Conditions

10.1 *Permitting*. Licensee shall be responsible for securing and maintaining, at Licensee's expense, all applicable permits and consents, including easements or other permissions from property owners, relating to its use of the Dark Fiber. Licensee shall comply with all applicable laws, rules and regulations at all times during the term of this Agreement. Upon request, Licensee shall provide OWNER evidence of its compliance with applicable legal requirements and its possession of any necessary consents or permissions.

Section 11 - Notice

Any notices required to be given by the terms of this Agreement shall be deemed sufficiently given when in writing and (i) delivered by hand, or (ii) mailed, postage prepaid certified delivery, to the addresses indicated below. Either Party may change the name of the person receiving notices and the address at which notices are received by so advising the other Party in writing.

A. **If to OWNER**:

For Contractual Notice:

For Operational Notice and routine maintenance:

For Emergency maintenance or restoration 24/7:

B. **If to Licensee**:

For Contractual Notice:

With a Copy To:

For routine maintenance:

For Emergency maintenance or restoration:

With a Copy To:

[SIGNATURES APPEAR ON FOLLOWING PAGE]

EXHIBIT A

Dark Fiber Description

1. **Demarcation Points**. The following table describes the Demarcation Points between which OWNER is providing Dark Fiber to the Licensee. The Dark Fiber route shall provide fiber optic continuity between the Starting and Ending Demarcation Points.

Dark Fiber Segment	Strand Qty.	Starting Demarcation Point	Ending Demarcation Point	Route Length (miles)

2. **Dark Fiber Licensee Fee.** In the first two years of the Initial term, the License Fee for Dark Fiber described in this Exhibit A shall be:

   $_____ per strand, per month, per mile

   In the third and subsequent years of the Initial Term, the License Fee shall be:

   $_____ per strand, per month, per mile

   In the sixth and subsequent years of any Renewal Term, OWNER may change the License Fee by providing written notice of the change to Licensee at least one hundred eighty (180) days prior to the expiration of the current term. At such time, OWNER reserves the right to obtain independent third party valuation of the dark fiber to assist in accurate determination of current market pricing. Such change in the Dark Fiber License Fee shall become effective upon the first day of the subsequent renewal period, if any. In no event shall increases in the seventh and subsequent year exceed the previous year's inflation rate as stated by the national Consumer Price Index for All Urban Consumers (national CPI-U, annual average index, not seasonally adjusted) , or by three percent (3%), whichever is less.

3. **Service Connection Fee.** Intentionally Blank.

4. **Fiber Maintenance Fee.** OWNER shall charge a maintenance fee of ____ per mile per month during the first two years after the Acceptance Date. Not less than one hundred eighty (180) days prior to the third anniversary of the Acceptance Date, OWNER will notify licensee if it intends to increase the maintenance Fee.

5. **Route.** The route(s) of the Dark Fiber described in the table above shall follow the path(s) as generally depicted on the Route Map in Exhibit B attached hereto.

6. **Delivery Date.** OWNER shall deliver to Licensee the Dark Fiber described in this Exhibit A, together with test results required under Section 3.5 of this Agreement, on or before thirty (30) days after the execution of the Agreement by the Parties hereto.

7. **<u>As-Built Documentation.</u>** Within fifteen (15) days of the Acceptance Date, OWNER shall provide Licensee final as-built drawings, in electronic format, of the portion of the Network along the Dark Fiber segments described in this Exhibit A. Such drawings shall include actual field data representing the after construction condition. As-built drawings shall include (i) the actual running line of the Network, (ii) depth of Facilities, if underground, (iii) manhole and handhole locations, (iv) fiber optic cable sequential numbers, (v) cable marker locations, and (vi) existing splice locations.

Appendix C – Sample Targeted RFI

SAMPLE TARGETED RFI

BACKGROUND:

SCOPE OF WORK: The purpose of this RFI is to explore the viability of establishing enhanced broadband services in _____. The City will consider submissions proposing all technologies and solutions including but not limited to the development of a Fiber-to-the-Home Network through a Public-Private Partnership (PPP).

Please note that the City will not award a contract based on the results of this RFI solicitation. However, should the City determine that a respondent's model is viable, the City may issue an RFP to respondents to this RFI that may result in a contract award. To be eligible to submit a proposal for the RFP, you must respond to this RFI. The City will utilize the information supplied by respondents to this RFI as informational only.

The goals of this RFI are as follows:

- To gauge the level of interest by providers on expanding the range and quality of existing broadband services and/or provision of new technology and services.
- Determine if there is provider interest in the establishment of a PPP
- To better understand what an ISP could offer the City in terms of service offerings and models
- To understand the level of commitment that would be required by the City in working with an ISP to secure enhanced broadband services.

In order for the City to evaluate responses to this RFI, bidders must provide the following information:

1. Letter of Interest
2. Brief Company Background
3. Two-page Executive Summary that provides an overview of your proposed solution
4. Completed Questionnaire

Please submit one hard copy and one electronic copy on a flash drive. Submissions are non-binding. Submission are due by _____

Please answer all the questions in the Questionnaire in the exact format as below.

QUESTIONNAIRE

General Background

1. Name of Company
2. Location of Company Headquarters
3. Years of existence as an ISP
4. Company size
5. Company revenue
6. Website
7. Do you currently have subscribers in Colorado?
8. What is your network technology (i.e., fiber, copper, wireless)
9. What services do you offer (i.e., voice, video, internet, home security, etc…)
10. What residential and commercial services do you provide?
11. Do you place data caps on your residential or commercial service?
12. Do you lease dark fiber?
13. Are you involved in any other municipal PPPs? If so, where? Please provide a paragraph description of each one.

Questions on Your Solution

1. Would you bring in any partners to assist with the build, management, operations, marketing or financing of your solution or will you be self-performing all functions (you do not need to name the partners at this time).

2. If you are proposing building a new network, would you build to 100% of the City? If not please explain.

3. When would your solution be ready for launch?

4. What services would you offer residents?

5. Would you offer gigabit internet connectivity? If so at what estimated price range?

6. Would you open an office in _____?

7. Would you consider a PPP model where the City owned the middle-mile network and your company owned and built the last mile infrastructure and connections?

8. Would you consider a PPP model where you invested in the buildout but entered into a long-term agreement for the City to lease to buy the assets?

9. Would you consider being the network operator for a municipal FTTP network?

10. Would you want the City to contribute cash funding towards your solution? If so, at what levels?

11. Other than cash, what else would you ask of the City for your solution?

12. Other than residential and business services what other things would you consider offering the community? For example, free drops to certain organizations, free Wi-Fi in the parks, etc…).

13. If you are proposing a network build, would your network be built aerial or underground or both?

Appendix D – FTTH Council Guidebook on Dig Once Policies

DIG SMART: Best Practices for Cities and States Adopting Dig Once Policies

EXECUTIVE SUMMARY

Advanced fiber networks and high speed broadband are increasingly important to a community's quality of life and a healthy local economy. An essential step to deploying broadband is installing conduit and fiber, often in underground trenches where other similar infrastructure is also located. This installation process requires excavators to dig in the public rights-of-way, frequently in areas that are already paved or developed. Excavation is both disruptive to the community and expensive for the service provider.

Cities and states can reduce excavation costs, minimize disruption in public rights of way, and encourage broadband deployment through "Dig Once." Dig Once encompasses several approaches to installing conduit in conjunction with other compatible construction projects.

This paper focuses on the most impactful form of this policy: governments installing conduit whenever there is underground construction in the public right of way -- whether that construction is for installing new utility equipment, repairs, or road work. The government then has the opportunity to lease that conduit to broadband providers that are interested in deploying fiber networks to the community. This approach benefits the community by facilitating broadband entry and by giving the government an ongoing revenue source. In fact, as we will show, these revenues can more than make up for the initial capital expense. While some governments may be hesitant to pay for conduit themselves because of its short-term budget impact, they can recoup that investment over time while also creating significant benefits from the community.

To distinguish it from other types of "Dig Once" policies, we call this approach "Dig Smart."This paper lays out the benefits of Dig Smart, how to implement Dig Smart, and the practical implications of Dig Smart.

I. DIG SMART POLICIES BENEFIT LOCAL COMMUNITIES.

Dig Smart benefits local governments and residents by promoting the deployment of advanced fiber networks and broadband competition. Dig Smart policies mandate the installation of conduit throughout public rights-of-way, lowering costs for providing broadband service and making a community more attractive for broadband providers hoping to break into a new market or expand their existing operations. The resulting competition leads to more choices

and lower prices for consumers. In addition, Dig Smart policies decrease the frequency of inconvenient and possibly dangerous construction along roadways, protect the reliability of broadband networks, and incentivize providers to lay fiber underground, hiding unsightly equipment and beautifying the community.

A. Dig Smart Promotes Competition in Broadband, Which Benefits Consumers.

Lack of competition is a serious problem in the broadband market. The Federal Communications Commission found that nearly 75% of homes have *at most* one choice in a provider of fixed Internet access at download speeds of 25 Mbps (the current definition for "broadband" and the minimum the FCC says is necessary to access the most advanced online applications).[1]

Without competition, consumers often are charged higher broadband Internet access prices. The Center for Public Integrity conducted an international comparative study on broadband competition, looking at the differences between comparable U.S. and French cities.[2] The French cities, on average, had seven choices in broadband service providers, whereas the U.S. cities averaged out to two choices.[3] In the U.S. cities, prices for broadband were up to *three and a half times higher* than in the French cities.[4]

One of the primary reasons competition is lacking in the broadband marketplace is that the barriers to entry are so high. The upfront costs of deploying broadband service are enormous – particularly for the most advanced fixed residential broadband service, fiber-to-the-premises. The most expensive part of deploying advanced fiber networks is the physical installation of conduit to hold the fiber, due to the costs of excavation.[5] Indeed, the Federal Highway

---

1 Federal Communications Commission, Fact Sheet: FCC Chairman: More Competition Needed in a High-Speed Broadband Market 1 (2014), https://apps.fcc.gov/edocs_public/attachmatch/DOC-329160A1.pdf.

2 Allan Holmes and Chris Zubak-Skees, *U.S. Internet Users Pay More and Have Fewer Choices than Europeans*, Center for Public Integrity (Apr. 1, 2015), http://www.publicintegrity.org/2015/04/01/16998/us-internet-users-pay-more-and-have-fewer-choices-europeans.

3 *Id.*

4 *Id*.

5 Jon Brodkin, *One Big Reason We Lack Internet Competition: Starting an ISP is Really Hard*, ARS Technica (Apr. 6, 2014), http://arstechnica.com/business/2014/04/one-big-reason-we-lack-internet-competition-starting-an-isp-is-really-hard/. The FCC found that installation costs were the largest cost element to deploying broadband via fiber. U.S. Dept. of Transp., Fed. Highway Admin., Office of Policy and Governmental Affairs, Executive Order: Accelerating Broadband Infrastructure Development 16 (2012), http://www.fhwa.dot.gov/policy/otps/workplan.pdf. The percentage cost of conduit as compared to the excavation project itself is only 0.1% to 4.3%. Gigabit Communities:

Administration estimates that it is ten times more expensive to install fiber where the provider has to excavate and repair an existing road than it would be to install fiber in conjunction with other roadwork.[6]

Dig Smart policies specifically address the costs of excavation in installing new conduit. San Francisco estimates that implementation of its Dig Smart law will lead to cost savings in excavation ranging from 25%-33%.[7] By minimizing the costs associated with conduit installation with a Dig Smart policy, more broadband providers will be able to compete in the marketplace and deploy broadband services. This will promote greater competition, which will foster lower prices, prompt incumbents to engage in more consumer-friendly behavior and lead to more choices for a community's residents.

B. Dig Smart Reduces Disruptive Repeated Excavation.

Installing equipment underground is disruptive, especially in areas that are already paved or developed or have underground infrastructure present. Excavators must first work through the jurisdiction's "locates" system to notify existing underground infrastructure owners and then those owners must mark the location of their facilities. Then the excavator must dig trenches where the conduit can be installed, which typically involves jackhammering through pavement. The excavators must surround the trenches with barricades, warning devices, and covers because the trenches are usually where people will encounter them. With each additional excavation, communities face risks to public safety, traffic disruption, risk of property damage service outages, and wasted government resources.

Traffic Disruption and Road Deterioration. Putting conduit underground alleviates crowding in urban public space, but the issues associated with excavation are exacerbated in these urban areas. Excavation along roadways will often halt or impede traffic, sometimes for

---

Technical Strategies for Facilitating Public or Private Broadband Construction in Your Community, http://www.ctcnet.us/wp-content/uploads/2014/01/GigabitCommunities.pdf

[6] *Eshoo, Walden Introduce "Dig Once" Broadband Deployment Bill,* Eshoo.House.Gov (Oct. 22, 2015), https://eshoo.house.gov/issues/economy/eshoo-walden-introduce-Dig Once-broadband-deployment-bill/.

[7] *See* U.S. Gov't Accountability Off., GAO-12-168R, Broadband Conduit Deployment 5 (2012), http://www.gao.gov/assets/600/591928.pdf; San Francisco, Cal., Ordinance 220-14 (Oct. 6, 2014) (codified in various provisions of the S.F. Public Works Code), http://www.sfbos.org/ftp/uploadedfiles/bdsupvrs/ordinances14/o0220-14.pdf. In addition, he Utah Department of Transportation estimated cost savings of 15.5% per mile when conduit and fiber are installed at the time a road is being constructed versus installing the conduit and fiber at a later time. U.S. Gov't Accountability Off., GAO-12-168R, Broadband Conduit Deployment 5 (2012), http://www.gao.gov/assets/600/591928.pdf. It is worth noting that the cost savings here are largely due to no longer having to re-excavate; laying conduit is enough to reap the benefits of the cost savings, as stringing the fiber generally does not require re-excavation. *Id.*

lengthy periods of time, and create traffic congestion that increases vehicular accidents and wastes commuters' time.[8] In addition, without Dig Smart, construction initiated by a broadband provider is often re-excavation, meaning that many roads have been excavated previously to install underground infrastructure. Like an article of clothing that is patched and patched again, repeated excavation damages the integrity of the road and shortens its lifespan.[9]

Public Safety and Service Outages. Excavating where utilities already exist comes with other risks. Although state authorities require various locates processes before excavators may begin digging,[10] there is always the chance that the excavator may inadvertently damage existing equipment underground, sometimes because the underground equipment operator failed to accurately mark its facilities.[11] Fiber is often installed alongside established utility infrastructure (*e.g.*, gas or electric). Any damage to those pipes or cables could cause a serious disruption of services and harm to surrounding property. The math is simple: the more often excavations occur around existing utilities, particularly for distribution of natural gas, the more likely that gas lines or other utilities are struck resulting in significant risks to life and property.

Wasted Governmental Resources. Underground conduit installation requires time and resources from both the excavator and the government. Because excavations involve public safety and environmental concerns, there are a number of legal and regulatory hurdles to approving a dig.[12] Excavation usually requires permits from the state or local permitting authority.[13] Indeed, if the excavation extends through a wide area, the excavator may need to seek permits in multiple jurisdictions. Further, governments will sometimes undertake (or require the excavator to undertake) environmental reviews for excavations, depending on how

---

8 *Id*.

9 U.S. Gov't Accountability Off., GAO-12-168R, Broadband Conduit Deployment 5 (2012), http://www.gao.gov/assets/600/591928.pdf.

10 *See, e.g.*, Cal. Gov't Code § 4216.2(a)(1); Ga. Code Ann. § 25-9-6(a); 220 Ill. Comp. Stat. 50/4; Kan. Stat. Ann. § 66-1804(a); Mo. Rev. Stat. § 319.026; Or. Admin. R. § 952-001-0050; Tex. Util. Code Ann. § 251.151(a).

11 CommScope, Broadband Applications and Construction Manual 8.2 (2014) http://www.commscope.com/Docs/Fiber_Optics_Const_Manual_CO-107147.pdf ("high consideration" is given to locates marks when determining excavation damages).

12 U.S. Gov't Accountability Off., GAO-12-168R, Broadband Conduit Deployment (2012), http://www.gao.gov/assets/600/591928.pdf.

13 *See, e.g.*, Mass. Gen. Laws ch. 81, § 21 ("No state highway shall be dug up … without written permit of the department …"); 605 Ill. Comp. Stat. 5/9-113 ("No … equipment of any public utility company, municipal corporation or other public or private corporation, association, or person shall be located ... under or along any highway, or upon any township or district road, without first obtaining written consent of the appropriate highway authority...").

extensive the excavations may be.[14] Governments must spend time and resources that could be conserved by only having to do the permitting and reviewing once.[15]

C. Dig Smart Incentivizes Installing Fiber Underground.

With Dig Smart in place, broadband providers can more easily and cost-effectively install fiber underground. Thus, the policy encourages broadband providers to choose to place their fiber underground rather than along utility poles. Undergrounding fiber has some significant advantages, including better service reliability and more attractive neighborhoods.

Service Reliability. Underground fiber improves the reliability of broadband services.[16] Unlike fiber attached to exposed poles, underground fiber is protected from ice, falling trees, high winds, natural disasters, lightning, sabotage, and other types of destruction, as well as decaying pole infrastructure.[17] This leads to fewer outages. Fiber on poles also requires more maintenance, such as trimming trees to prevent them from interfering with the lines, as well as other repairs from normal wear and tear of open-air exposure.[18] Placing lines underground therefore reduces the costs of providing service and facilitates competition.

Aesthetics. Communities generally prefer to have fiber underground for aesthetic reasons as well because it eliminates unsightly utility poles and hanging lines that obscure the landscape.[19]

II. How to Implement Dig Smart.

Dig Smart mandates government installation of conduit whenever excavation occurs in the public right-of-way and where government-owned conduit does not already exist, whether a private entity is excavating or the government is digging for a public works project. Dig Smart

---

[14] California Environmental Quality Act, Cal. Pub. Res. Code § 21000 *et seq*. This statute, and others like it, requires an in-depth environmental impact report for all activities for which private entities receive a government-issued permit.

[15] U.S. Gov't Accountability Off., GAO-12-168R, Broadband Conduit Deployment 6 (2012), http://www.gao.gov/assets/600/591928.pdf.

[16] *Id*. at 5.

[17] *Cf.* Edison Electric Institute, Out of Sight, Out of Mind 2012: An Updated Study on the Undergrounding of Overhead Power Lines (2012), http://www.eei.org/issuesandpolicy/electricreliability/undergrounding/documents/undergroundreport.pdf.

[18] *Id.* at 25.

[19] Edison Electric Institute, Out of Sight, Out of Mind 2012: An Updated Study on the Undergrounding of Overhead Power Lines 5 (2012), http://www.eei.org/issuesandpolicy/electricreliability/undergrounding/documents/undergroundreport.pdf.

includes requirements that developers of new subdivisions install conduit or other appropriate or necessary communications infrastructure to each residence in the subdivision and in public or homeowner's association rights-of-way in the subdivision. With mandatory conduit installation, the Dig Smart approach is for the government to pay for the extra incremental costs of laying down the conduit, with the government retaining ownership of the installed conduit.

Dig Smart also minimizes legal controversies; unlike with respect to a private service provider installing underground infrastructure on private property, the applicable government entity already possesses authority to control construction in the public rights-of-way. Governments also possess broad latitude to condition the grant of construction permits in the public rights-of-way.[20] Even in states where municipal broadband is restricted,[21] Dig Smart is an appropriate and lawful approach; municipalities would not be running afoul of such restrictions on providing service, as the conduit itself is not a service but only a facility.

With Dig Smart, conduit is installed as excavation occurs, gradually increasing coverage of the conduit network around the community with each new construction project. Dig Smart makes the community ready for deployment of advanced broadband services and eliminates additional excavation necessary to make those services a reality. In addition, service providers do not have to shoulder the added burden of seeking trenching partners or paying for the costs of conduit installation, and thus the opportunity to lease government conduit will encourage them to build a fiber network in the community. By maintaining ownership of the conduit, the government generates revenue by leasing those valuable assets out to broadband providers interested in providing fiber service to the community. Dig Smart works for the community and works for the government.

For governments desiring to reap the community benefits of adopting Dig Smart, model legislation is included in Appendix A.

---

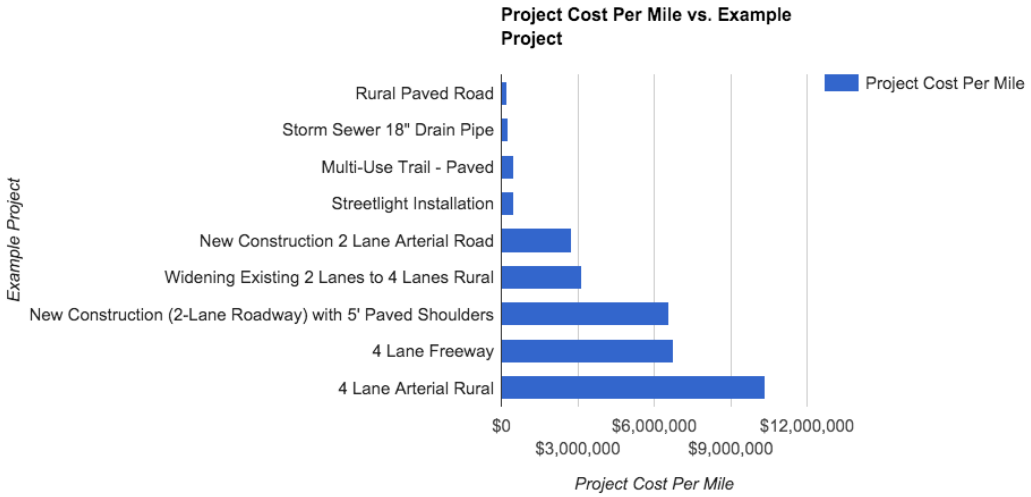
[20] *See Jason Koebler, The 21 Laws States Use to Crush Broadband Competition, Motherboard (Jan. 14, 2015), http://motherboard.vice.com/read/the-21-laws-states-use-to-crush-broadband-competition.*

[21] Dig Once ideas—including Dig Smart—tend to be politically popular, supported by Democrats and Republicans. The federal Dig Once House bill, sponsored by Rep. Eshoo (D-Calif.) and Rep. Walden (R-Or.), received praise from both sides of the aisle, along with endorsements from FCC Commissioners Rosenworcel (a Democrat) and Pai (a Republican). *See* Moriah, Mensah, *"Dig Once" Could Lead to Smarter Broadband*, R Street (Jan. 14, 2016), http://www.rstreet.org/2016/01/14/dig-once-could-lead-to-smarter-broadband/. *See also* Amir Nasr, *Widely Supported 'Dig Once' Bill Faces Procedural Hurdles*, Morning Consult (Nov. 18, 2015), http://morningconsult.com/2015/11/widely-supported-dig-once-bill-faces-procedural-hurdles/; Alisha Green, Bipartisan "Dig Once" Legislation Provides Hope for Broadband Expansion, Government Technology (Nov. 2, 2015), http://www.govtech.com/network/Bipartisan-Dig-Once-Legislation-Provides-Hope-for-Broadband-Expansion.html ("At least one issue on Capitol Hill brings together Republicans, Democrats, the tech industry, and the White House: legislation to expand high-speed Internet access nationwide, especially for rural, tribal, and other remote areas.").

A. How Dig Smart Works for Governments in Practice

Governments can use Dig Smart as a source of potential revenue, once the municipality or other governmental authority has installed enough conduit to interest broadband providers in leasing. With a private excavation project, the government typically would pay the costs for materials (the conduit itself), installing the conduit in the excavated trench, and any design variations in a private excavation project required to facilitate conduit installation. For public works projects, the government can install conduit in conjunction with existing construction much less expensively than would be possible in a separate excavation and installation project. The costs of conduit, including materials and installation, are slight relative to the expenses for digging up and repairing the ground.[22] Sample road and underground construction costs from various cities generally run from $200,000 per mile for something like a sewer replacement to $10 million per mile for larger road system construction.

Figure 1[23]



In contrast, the average cost of the conduit itself is around $10,000 per mile (or around $1.90 per foot), making it 0.1% to 4.3% of the total cost of any given excavation project.[24]

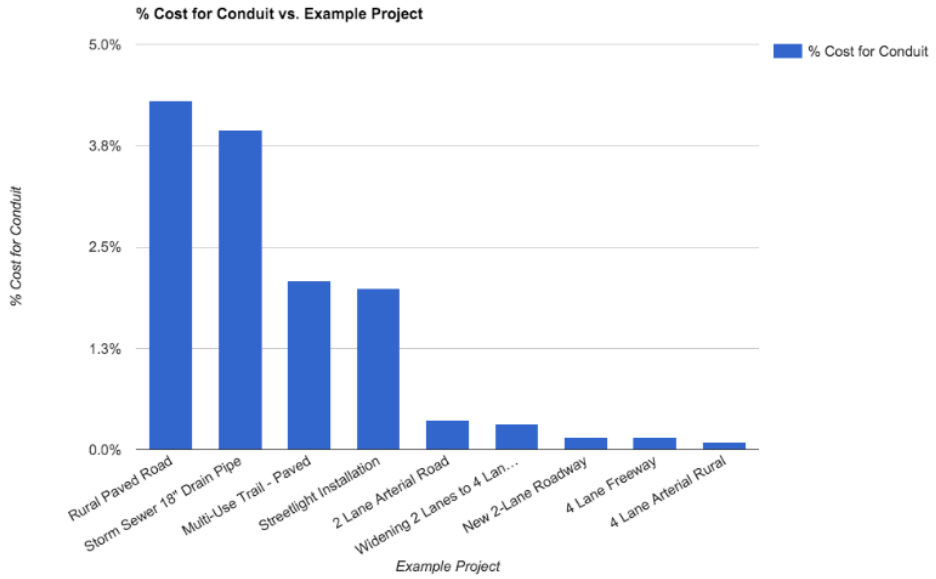
---

[22] U.S. Dept. of Transp., Fed. Highway Admin., Office of Policy and Governmental Affairs, Executive Order: Accelerating Broadband Infrastructure Development 16 (2012), http://www.fhwa.dot.gov/policy/otps/workplan.pdf ("[T]he largest cost element for deploying broadband via fiber optic cable is the cost of placement, such as burying the fiber in the ground, rather than the cost of the fiber itself.").

[23] Data from discussions with BHC Rhodes, civil engineering firm: http://ibhc.com/

[24] *Gigabit Community: Technical Strategies for Facilitating Public or Private Broadband Construction in Your Community*, http://www.ctcnet.us/blog/gigabit-communities-how-local-governments-can-facilitate-private-investment-in-new-gigabit-networks/.

Figure 2[25]



Dig Smart does require the government to pay certain upfront construction costs on top of the actual cost of the conduit itself. Installation will often require additional fees for design changes in trenching—the trenching required for sewer lines, for example, may not be the kind typically used for conduit and accommodating those changes will incur design costs. Other additional costs may include extra labor fees for installation. However, the cost of installation should be considered an investment. Governments can usually install conduit at a discounted rate per linear mile as compared with private utilities.[26] Moreover, after installation, the government will own the conduit and, because it is in the public right-of-way, the government will not owe any licensing fees to any landowner on which the conduit is located. The government would then lease the conduit to a broadband provider and recover the modest costs of installation.

The following example shows how quickly the government would be able to recover its investment. Assume the cost of the conduit itself and extra conduit installation fees (independent of the main excavation costs) is $25,000 per mile (or $4.73 per foot).[27] Private service providers typically lease installed conduit for between $0.65 and $0.80 per linear foot of conduit per year. With a lease rate of $0.65 per linear foot of conduit annually, a local agency would more than recover its upfront installation costs after 8 years of leasing (8 x $0.65 = $5.20).

---

[25] Data from discussions with BHC Rhodes, civil engineering firm: http://ibhc.com/

[26] Data from discussions with BHC Rhodes, civil engineering firm: http://ibhc.com/

[27] This is not meant to be an exact number on how much installation of conduit would cost, but rather, an approximation, with an illustration on how such a policy could be profitable over time.

The 8-year period here is a minimal estimate, too, especially if the government manages to secure multiple lessees. Where the government installs conduit with multiple duct banks to accommodate multiple providers, it can recover costs more quickly with adequate demand. The additional revenue could be used for a number of purposes, including covering internal costs for managing the public rights-of-way. Below is an example on calculating a return on investment ("ROI"), assuming a lease to just one broadband service provider.

Fiber Installation Cost (per mile)	$25,000
Fiber Lease Rate (per mile per year)	$3,432 (or $0.65 per foot)
10-Year Income	$34,320
Return-On-Investment (ROI) Example	37%

To protect its investment in the conduit and discourage re-excavation, a government can also require that new broadband providers use existing conduit to the maximum extent feasible. Of course, the government is unlikely to obtain lessees immediately upon implementing Dig Smart legislation. Broadband providers would want to lease conduit after the community has a critical mass of conduit network already in place, and the actual recovery time of installation costs will depend on when broadband providers lease the government's assets. Accordingly, governments interested in Dig Smart should enact legislation as soon as possible, because the benefits of Dig Smart begin to accrue as more excavation projects are undertaken. Once Dig Smart is in place, a government can begin building up enough conduit to begin leasing it to generate revenue in excess of costs.

B. Other Ways to Encourage Dig Smart

States too should be interested in bringing more broadband options to their citizens. States, of course, can implement Dig Smart policies and install conduit when excavating rights-of-way under state jurisdiction. Although states do not control access to local rights-of-way, states can encourage Dig Smart policies at the municipal level in at least two ways.

First, states may adopt resolutions or other legislative policies that encourage municipal enactment of Dig Smart laws.[28] This allows states to signal support for Dig Smart at no cost to the state.

Second, states may consider creating a monetary incentive for municipalities to adopt Dig Smart laws. States could condition grant of certain funds for local governments based on the local government implementing a Dig Smart policy. For instance, state road construction funding could be conditioned on the locality installing conduit that will increase the opportunities in the local community for better advanced communications services.

[28] *See* Minn. Stat. § 237.90; Fla. Stat. § 364.0135.

III. OTHER "FLAVORS" OF DIG ONCE

Dig Smart is the gold standard of Dig Once. There are other types of Dig Once that are unlikely to be as effective as Dig Smart but nonetheless encourage broadband deployment while reducing the burdens of additional excavations. These other types of Dig Once are described here and compared to the advantages of Dig Smart. The primary other "flavors" of Dig Once policies and laws are: (1) coordination, (2) voluntary joint trenching, and (3) mandatory joint trenching.

(1) Coordination.[29] Coordination requirements help inform interested excavators, such as broadband providers, when underground or road construction is going to happen so that they can be prepared to install equipment in conjunction with scheduled excavations. Coordination is facilitated by governments establishing a "coordination database" and requiring underground facilities owners to update the coordination database with information on upcoming scheduled excavation. Interested excavators may then use this database for coordinating underground facilities installation with existing planned construction.

A coordination policy requires governments to expend resources on organizing and posting information from different entities. While a coordination policy would help some enterprising service providers in identifying excavation areas where they could potentially coordinate installation of their equipment, the marginal benefits of this are low, and it in no way guarantees that conduit will actually be installed. Coordination databases rely on the existence of other interested entities to effectuate infrastructure deployment. Where no service provider is already building in the market and therefore monitoring the database, opportunities to install conduit when there is planned excavation in the public rights-of-way may be missed. Moreover, this policy by itself does not allow the government to control for quality or for competition-maximizing conduit that has room to accommodate more than one fiber cable. Finally, with coordination, any installed conduit will be the property of the private entity, rather than the government. The government, therefore, has little direct opportunity to earn a return from implementing a coordination policy.

(2) Voluntary Joint Trenching. Voluntary joint trenching requires entities that have received approval to excavate in public rights-of-way to formulate construction plans, and schedule construction, with other service providers that are interested in installing or maintaining equipment in public rights-of-way.[30]

Voluntary joint trenching (in contrast with mandatory joint trenching, discussed below) is termed "voluntary" because the policy relies on other excavators volunteering to jointly trench for the Dig Once benefits to be realized. (The initial excavator is required, however, to formulate construction plans with and schedule construction with other service providers that want to jointly trench.) The disadvantage of this approach to Dig Once is that if no broadband provider comes forward within the allotted time after the lead excavator notifies of an

---

[29] *See, e.g.*, Santa Monica, Cal., Mun. Code, § 7.06.300(b); Minn. Stat. § 161.462.

[30] *See, e.g.*, 30-092 Vt. Code R. § 8091; Ocala, Florida, Mun. Code, § 58.136.

excavation, then no conduit would be installed. Interested service providers could miss the window for joint trenching and end up having to re-excavate. Indeed, a provider that does not yet exist by definition cannot take advantage of this opportunity. Voluntary joint trenching has many of the same drawbacks as a coordination policy. Ultimately, this policy would *encourage* more efficient excavations (and additional deployment of broadband network infrastructure) but not *guarantee* it. Although governments should not depend on voluntary joint trenching as a reliable means of achieving Dig Once objectives, if companies wish to jointly trench, governments should not prevent them from negotiating a private solution to excavation and conduit installation. Industry-driven initiatives in joint trenching can work in tandem with Dig Smart laws to minimize excavation and maximize installation of conduit.

(3) Mandatory Joint Trenching. Mandatory joint trenching requires all potential excavators to install their infrastructure in the same trench at the same time. All parties then split the costs of the excavation.[31] A mandatory joint trenching law would require that all excavators determine a "lead." That lead excavator would then approach the city to receive a "joint trench" permit on behalf of all the service providers installing underground infrastructure in the excavation.

Mandatory joint trenching makes installation of conduit more certain than with voluntary joint trenching, as broadband providers must install conduit where it does not already exist as part of the joint trenching. Some municipalities with this type of joint trenching also have an enforcement clause that prevents re-excavation within a certain amount of time.[32] But these restrictions on re-excavation (often called moratoria) can delay broadband deployment and discourage competition if an interested broadband service provider misses the window. If broadband providers miss the period for joint excavation, they could be barred from re-excavating for years. This delay would work against the goals of Dig Once, which include deploying more broadband for consumers. In addition, other types of non-broadband excavators could be shut out from installing important equipment for their services. Ultimately, these unintended consequences could hurt various service providers and local residents.

---

[31] *See, e.g.,* Los Angeles Department of Public Works, Joint Trench Utility Permit Guidelines (2015), http://dpw.lacounty.gov/general/forms/download/2175.pdf.

[32] *See* Houston, Texas, Mun. Code, § 40-145.

CONCLUSION

High-speed broadband Internet access brings greater prosperity and convenience to communities. Local and state government policy therefore should facilitate more competition in the broadband market. Dig Smart is a win-win policy for states and municipalities, as residents benefit from broadband competition (bringing faster service at lower prices) and less excavation disruptions. Unlike some other government initiatives, Dig Smart has the potential for government to recoup funds spent on public works through leasing of conduit. Dig Smart is the best way for communities to accelerate deployment of the fastest, most advanced broadband and should be seriously considered by any city or state that wants to bring better services to its residents.

APPENDIX A: MODEL LEGISLATION

This appendix includes model legislation for (1) municipalities or states to implement Dig Smart policies and (2) states to facilitate Dig Smart policies at the municipal level. The model legislation here also includes definitions and sensible exceptions for Dig Smart requirements (*e.g.*, in cases of emergency repair).

These provisions may be adapted for municipal or state use. In place of "city" or "state" the model legislation uses Government Entity. These provisions are models to serve as a starting point for cities and states interested in obtaining the benefits of Dig Smart; the provisions may be altered as appropriate or necessary to conform to specific community preferences and existing laws.

Definitions

Section XX.XX

As used in this chapter creating "Dig Smart" requirements, the following definitions apply:

(1) "Communications Infrastructure" means conduit installed in public rights of way that can accommodate at least two separate fiber optic cables.

(2) "Developer" means any person or private entity that proposes to subdivide, divides or causes to be divided real property into a subdivision.

(3) "Emergency" means an Unexpected Occurrence requiring prompt action to prevent or mitigate loss of, or damage to, life, health, property, or essential public services.

(4) "Excavate" or "Excavation" means any work or action in which earth, rock, pavement, or other material in the ground or underwater in a public right-of-way is moved, removed, or otherwise displaced by means of tools, equipment, or explosives in any of the following ways: grading, trenching, digging, ditching, drilling, tunneling, scraping, cable or pipe plowing and driving, or any other means.

(5) "Excavator" means any person, private entity, or Government Entity that engages in Excavation or has applied for a permit from Government Entity to Excavate.

(6) "Operator" means any person, private entity, or Government Entity that owns, operates, or maintains Underground Facilities.

(7) "Public Works Project" means any Excavation project undertaken by Government Entity.

(8) "Underground Facilities" means underground or submerged conductor, pipe, structure, conduit, or equipment used or installed for use in providing electric or communications service or in carrying, providing, or gathering gas, oil or oil products, sewage,

wastewater, storm drainage, or water or other liquids. All Underground Facilities shall be considered to extend up to the connection to the customer's facilities.

(9) "Unexpected Occurrence" is an unexpected event, including without limitation fires, floods, earthquakes, or other soil or geologic movements, riots, accidents, and damage to Underground Facilities requiring repair.

Exceptions to Dig Smart Requirements

Section XX.XX

(a) Emergency. Operators, Excavators, and Developers are not required to comply with "Dig Smart" requirements in cases of Excavation because of an Emergency.

(b) *De Minimis* Excavation. Notwithstanding anything else set forth in this chapter, "Dig Smart" requirements involving Excavation only apply when the contiguous length of the proposed Excavation will be at least 900 linear feet in the public right-of way.

Mandatory Installation of Conduit

Section XX.XX

(a) Installation of Conduit in Public Rights-of-Way in Public Works Projects. Whenever an agency or department of the Government Entity undertakes a Public Works Project involving the planning, construction, reconstruction, or repaving of a public right-of-way, such project shall include, to the maximum extent practicable and feasible, installation of underground Communications Infrastructure by the Government Entity.

(b) Installation of Conduit in Public Rights-of-Way in Other Excavations.

(1) To the maximum extent practicable and feasible, the Government Entity shall condition all Excavation permits on the installation of underground Communications Infrastructure on behalf of the Government Entity.

(2) The Government Entity shall provide at the Government Entity's cost the necessary materials (but not any equipment used for installation) for the permittee to install underground Communications Infrastructure in the public right-of-way.

(3) The Government Entity shall bear all reasonable and documented design and construction costs associated solely with inclusion of the Government Entity's Communications Infrastructure in the Excavation.

(4) Title to the installed Communications Infrastructure provided by the Government Entity shall vest in the Government Entity upon installation without any further action of the Excavator or the Government Entity.

State Facilitation of Local Dig Smart

Section XX.X

To the extent practicable, the Department of XX shall encourage and assist local units of government to adopt and implement "Dig Smart" policies for construction or other improvements to county state-aid highways, municipal state-aid roads, and any other rights-of-way under the local unit of government's jurisdiction. "Dig Smart" refers to policies that require the government entity to install conduit in conjunction with excavation along public rights-of-way.

APPENDIX B: ADDITIONAL RESOURCES

- Federal Highway Administration Policy Brief on Dig Once
- Executive Order on Dig Once
- U.S. Government Accountability Office Study on Dig Once
- Study on the Effects of Undergrounding Power Lines
- Article on Eshoo-Walden House Bill

Appendix E – City of Greeley Dig Once Ordinance

CITY OF GREELEY, COLORADO
ORDINANCE NO. _____, 2019

AN ORDINANCE ADDING CHAPTER 14.80 OF THE GREELEY MUNICIPAL CODE REGARDING EXCAVATION IN THE PUBLIC RIGHT OF WAY

WHEREAS, the City of Greeley ("City") is a Colorado home rule municipality, with all powers and authority vested under Colorado law; and

WHEREAS, the City owns and maintains a system of streets and Rights of Way for the promotion of public health, safety, welfare and convenience; and

WHEREAS, the City is aware that the demand for technological infrastructure in the future will likely require the installation of additional facilities in, under and upon City-owned streets and Rights of Way; and

WHEREAS, contractors excavating or otherwise working within the City Rights of Way pursuant to a lawfully issued permit are required to perform construction or maintenance operations within the parameters of the Greeley's Municipal Code; and

WHEREAS, demand for access to broadband services is growing, and in order to fill such demand, more broadband network infrastructure is needed; and

WHEREAS, the City Council has considered the above, finds adoption of this Ordinance is necessary to protect the health, safety and welfare of the City.

NOW THEREFORE, BE IT ORDAINED BY THE CITY COUNCIL FOR THE CITY OF GREELEY, COLORADO, AS FOLLOWS:

Section 1. Chapter 14.80 of the Greeley Municipal Code shall be adopted as set forth on Exhibit A attached hereto and incorporated herein by this reference.

Section 2. This Ordinance shall become effective five days following its final publication, as provided by the Greeley Municipal Charter.

PASSED AND ADOPTED, SIGNED AND APPROVED THIS _____ DAY OF _____, 2019.

ATTEST: CITY OF GREELEY, COLORADO

_____ _____

City Clerk Mayor

CHAPTER 14.80
EXCAVATION IN THE PUBLIC RIGHT OF WAY

14.80.010 LEGISLATIVE DECLARATION.

A. Purpose: to provide principles and procedures for the coordination of construction excavation within any public Rights of Way, and to protect the integrity of the Rights of Way and road system.

B. Objectives. Public and private uses of Rights of Way for location of Facilities employed in the provision of public services should, in the interests of the general welfare, be accommodated; however, the City must ensure that the primary purpose of the Rights of Way, namely the safe and efficient passage of pedestrian and vehicular traffic, is maintained to the greatest extent possible. In addition, the value of other public and private installations, Facilities and properties should be protected, competing uses must be reconciled, and the public safety preserved. The use of the Rights of Way corridors for location of Facilities is secondary to these public objectives. This ordinance is intended to assist in striking a balance between the public need for efficient, safe transportation routes and the use of Rights of Way for location of facilities by public and private entities. It thus has several objectives:

1. To insure that the public health, safety and welfare is maintained and that public inconvenience is minimized.

2. To facilitate work within the Rights of Way through the standardization of regulations and permitting.

3. To conserve and fairly apportion the limited physical capacity of the public Rights of Way held in public trust by the City.

4. To promote cooperation among the Applicants and Permittees (as defined herein) and the City in the occupation of the public Rights of Way, and work therein, in order to (i) eliminate duplication that is wasteful, unnecessary or unsightly, (ii) lower the Permittee's and the City's costs of providing services to the public, and (iii) minimize Rights of Way excavations.

14.80.020. DEFINITIONS

For the purpose of this Chapter, the following words shall have the following meanings:

A. "*Applicant*" means an owner or duly authorized agent of such owner, who has submitted an application for a Permit to Excavate in the Rights of Way.

B. "*City*" means the City of Greeley, Colorado.

C. "*Conduit*" means a single enclosed raceway for cables, fiber optics or other wires, or a pipe or canal used to convey fluids or gases.

D. "*Department*" means the Department of Public Works.

E. "*Developer*" means the person, partnership, corporation, or other legal entity who is improving property within the City and who is legally responsible to the City for the construction of improvements within a subdivision or as a condition of a building permit or other land use or development authorization.

F. "*Director*" means the Director of Public Works of the City or his/her authorized representative.

G. "Facility" or "*Facilities*" means, including, without limitation, any pipes, conduits, wires, cables, amplifiers, transformers, fiber optic lines, antennae, poles, ducts, fixtures and appurtenances and other like equipment used in connection with transmitting, receiving, distributing, offering, and providing broadband, utility and other services.

H. "*Landscaping*" means materials, including without limitation, grass, ground cover, shrubs, vines, hedges, or trees and non-living natural materials commonly used in landscape development, as well as attendant irrigation systems.

I. *"Major Work"* means any reasonably foreseeable Excavation that will affect the Rights of Way for more than five (5) consecutive calendar days.

J. "*Owner*" means any Person, including the City, who owns any Facilities that are or are proposed to be installed or maintained in the Rights of Way.

K. "*Permit*" means any authorization for use of the Rights of Way granted in accordance with the terms of this ordinance, and other applicable laws and policies of the City.

L. "*Permittee*" means the holder of a valid Permit issued pursuant to this Chapter and other applicable provisions of applicable law for Excavation in the Rights of Way, including but not limited to the City of Greeley for its own capital projects.

M. "*Person*" means any person, firm, partnership, special, metropolitan, or general district, association, corporation, company, or organization of any kind.

N. "*Rights of Way*" means any public street, road, way, place, alley, sidewalk or easement, that is owned, held or otherwise dedicated to the City for public use.

14.80.030. POLICE POWERS

A Permittee's rights hereunder are subject to the police powers of the City, which include the power to adopt and enforce ordinances, including amendments to this ordinance, and regulations necessary to the safety, health, and welfare of the public. A Permittee shall comply with all applicable ordinances and regulations enacted, or hereafter enacted, by the City or any other legally constituted governmental unit having lawful jurisdiction over the subject matter

hereof. The City reserves the right to exercise its police powers, notwithstanding anything in this ordinance or any Permit to the contrary. Any conflict between the provisions of the ordinance or a Permit and any other present or future lawful exercise of the City's police powers shall be resolved in favor of the latter.

14.80.040. COLOCATION OF THE CITY'S FIBER CONDUIT

A. Intent. To permit the City to colocate conduit for fiber whenever an entity is proposing construction activities that involve directional boring or open trenching within public Rights of Way.

B. Requirements. To colocate and install City owned fiber conduit simultaneously with a Permit holder's construction activity at the City's request:

1. Right of Way Permits. All permittees proposing construction activities that involve directional boring or open trenching within public Rights of Way that extend more than five-hundred (500) feet in length are required to co-locate and install City owned conduit simultaneously with the Permit holder's construction activity at the City's request, unless such co-location requirement is not allowed by any other state or federal law, rule, or regulation. The City may, upon initial review of the permit application, determine that the permittee's proposed construction activity does not demonstrate a need for colocation of City infrastructure.

2. Colocation of Conduit. For any construction activity that requires a colocation of City conduit, the City shall, as a condition of the issuance of the permit or the continued validity of a permit, direct the permittee to install City owned conduit with tracer wire and associated infrastructure, as identified by the City, concurrent with the installation of the permittee's infrastructure following the City's review and approval of all estimated costs associated with the colocation of the City conduit. The permittee shall install the City conduit with tracer wire adjacent to the permittee's infrastructure and within the same bore or trench alignment. The City will bear all construction installation cost associated with the colocation, including the City conduit, pull boxes, and all other materials and infrastructure to be installed, including the incremental labor and equipment cost incurred by the permittee (or its contractor or subcontractor) that are reasonably and directly attributable to the required colocation of City conduit, material and infrastructure. The City shall not pay for design or potholing cost.

3. Documentation. When a colocation of City conduit is required, the permittee may be required to submit signed as-built documentation of the City's conduit to the City if physical verification of the City conduit is not possible.

4. Fees. The City designated representative may incrementally waive Rights of Way permit fees set forth for any construction activities associated with the colocation project.

14.80.060. CONSTRUCTION OF NEW STREETS

A. Intent. This is intended to require those constructing public streets, public improvements, and alleys, including the City and Developers, to provide and install such conduit and appurtenances to accommodate future broadband needs within the Rights of Way without further excavation.

B. Requirements. Whenever any new public street or alley is constructed, whether by the City as a public works project or by a Developer or other private party in conjunction with development, the following shall be required:

1. In all new local streets and alleys serving or abutting residential development, a minimum of two 2" conduit with pull box every 600 (six hundred) feet or less (and at every 90 degree turn) shall be installed by the party constructing the street or alley.

2. In all new collector or arterial streets serving or abutting residential development, and in all new streets and alleys serving or abutting nonresidential development, a minimum of four 2" conduit with pull box every 600 (six hundred) feet or less (and at every 90 degree turn) shall be installed by the party constructing the street or alley; provided however that at the discretion of the Director, the number and size of the conduit and spacing of pull box may be modified to address the reasonably known plans and/or demand for broadband capacity in these locations.

3. In addition to installing conduit, the party constructing the street or alley will be required to install such vaults and other appurtenances as may be necessary to accommodate installation and connection of broadband Facilities within the conduit.

4. All construction and installation shall be accomplished according to construction standards adopted by the City. The construction standards shall be adopted with due consideration given to existing and anticipated technologies and consistent with industry standards.

5. All Facilities installed by Developers or other private parties pursuant to this section shall be conveyed and dedicated to the City with the dedication and conveyance of the public street and/or Rights of Way.

6. All installation costs shall be the responsibility of the party constructing the public street.

C. Use by Broadband Service Providers and Network Owners. Whenever conduit installed or to be installed under this section is available or will become available within a newly constructed public streets or Rights of Way upon dedication, all broadband service providers or network owners thereafter locating Facilities within such street, alley or Rights of Way shall be required to locate their communications lines within such conduit unless it can be demonstrated to the reasonable satisfaction of the City that such location is not technologically feasible or reasonably practicable. Conduit capacity shall be allocated to broadband service providers or

network owners on a first-come, first-served basis; provided, that the City may reserve capacity within such conduits for its own use; and provided further, that the Director may adopt additional rules for conduit allocation in order to ensure that all broadband service providers and network owners have reasonable access to the Rights of Way and that no barriers to entry or competition result from the allocation of conduit space.

D. Fees. The City reserves the right to charge reasonable fees for the use of conduit installed pursuant to this section, to the extent consistent with and as limited by federal and state laws. Any such fees shall be established by resolution or ordinance.