Enclosed for your information please find an overview presentation on CableRunner and a document addressing “Commonly Asked Questions”.

To discuss in further detail CableRunner’s innovative method for installing critical fiber facilities in existing public stormwater and utility tunnel systems to better enable current and emerging technologies – faster, more cost-effectively, and less disruptively than traditional methods of fiber construction, please contact:

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Thank you for your interest in CableRunner.
“The only complete and flexible solution to build fiber optic networks in urban areas worldwide”
WHAT IS THE BUSINESS OF CABLERUNNER INTERNATIONAL?

- Fiber optics is the only technology that will deliver enough bandwidth and reliably at a low enough cost to meet the consumer demands of the next decade.

- The traditional way to build fiber optic networks in urban areas is trenching, which means there always is a traffic and pollution problem in dense city areas. This old method is also slow and less cost efficient.

- CableRunner International is specialized in building fiber optic networks without digging or trenching. With our technology, we are using existing city infrastructure like sewer systems or storm water drains to install fiber networks.

- The technology, patented by CableRunner, consists of installation solutions for all pipe sizes; particularly for small pipes, robotic devices have been developed that perform the installation inside the pipes. This technology allows faster installation of fiber networks with significant and competitive cost advantages compared to conventional deployment.
WHO IS CABLERUNNER INTERNATIONAL?

- The CableRunner technology was invented by the Sewer Department of the city of Vienna in 1996 and was applied first to the city’s own sewer and storm water systems.

- CableRunner Austria was founded in 1999, and started its international business activities by establishing subsidiaries in USA, Spain, China and Russia. Since then, the technology has been continuously improved and more than 2,000 km of in-sewer fiber optic networks in different countries worldwide have been successfully deployed.

- In 2009, a majority share of 76% of CableRunner Austria was acquired by Telekom Austria. Following their strategy, Telekom Austria decided to concentrate the activities of CableRunner in their primary markets Austria and Southeastern Europe. The international operations were assigned to CableRunner International.
WHAT ARE COMMON ISSUES FOR INFRASTRUCTURE IN URBAN AREAS?

- Unprotected aerial installations
- Permit complications and bureaucracy
- Extreme weather conditions
- Noise, air pollution and traffic jams due to construction sites
WHAT ARE THE ADVANTAGES OF OUR TECHNOLOGY?

By using existing city infrastructure, many of the difficulties usually encountered using conventional installation methods can be avoided.

- CableRunner fiber optic installations without trenching require minimal permitting and enable a fast installation time
- Flexible and easy to expand – individual products for different demands of the project – cable interchangeability
- Environmentally friendly – no pollution – no traffic problems
- Protection and security for the sewer environment and the installation
- Tested and proven for over 18 years
- Allows secure operation with no additional maintenance
- Long-term warranty – long lasting operation with easy add-on capacities in the future
- Cost effectiveness compared to other installation methods
- Minimal labor required
- Designed by sewer experts for the sewer environment
HOW DOES THE CABLERUNNER INSTALLATION PROCESS WORK?

- The CableRunner truck arrives at the installation site, fully equipped with installation robots, power supply and installation material.

- The specially developed threaded bolt for securing the cable trays ensures safe installation. The construction prevents any stress in the sewer pipe. The complete installation can be removed easily if required.

- The system is robust and cannot be damaged by TV inspections, high pressure or manual cleaning work. All materials employed are resistant to corrosive substances contained in the sewage.
HOW DOES THE CABLERUNNER SYSTEM WORK?

- CableRunner System works with the highly flexible modular cable system (MCS).

- The MCS cable comprises a bundle of thin micro air tubes into which the glass fibers are blown after successful installation - up to 1.5 km at a time. There is also the choice of inserting all the fibers or initially just a few. This is what makes it so quick, easy and cost effective to set up the network. As soon as greater capacity is required, it can be produced by inserting more fibers without the need for additional installation work.

- The system is open to a lot of types and manufactures of glass fibers. All fiber types can be inserted into the MCS mini pipes. So flexibility is increased even further because it is possible to use various types within one MCS cable.
HOW DOES THE CABLERUNNER SYSTEM WORK?

CableRunner’s Technology - Level Access Net - accessible sewers

Installation robot in non-accessible sewer
HOW DOES THE CABLERUNNER SYSTEM WORK?

- The products of CableRunner are developed to perform under extreme conditions while preserving the integrity of both, the sewer structure and the installation itself. With CableRunner’s fiber optic deployment system SewerLine™ cable trays have been installed in existing man-accessible and non-accessible sewer systems in major cities throughout the world.

**SewerLine Flexible™** carries:
- Common FO cable and / or micro cable
- Modular cable system (micro airtubes)
- Any kind of fiber, not committed to manufacturer

**Sewerline FLEXIBLE “A”**
for accessible sewers (>80cm)
Up to $2 \times 864 = 1,728$ fibres

**Sewerline FLEXIBLE “N”**
for non-accessible sewers
Up to $8 \times 96 = 768$ fibres
Case Study Vienna, Austria

In 2004, CableRunner was asked to upgrade Vienna’s fiber optic backbone with the CableRunner technology. During the course of the project, more than 250 km of fiber optic cables were installed inside Vienna’s sewer system.

Since 2009, the City of Vienna, together with incumbent Telekom Austria, initiated a FTTH project covering one low to mid and one mid to high income area. Both districts together comprise some 70,000 apartments. CableRunner was assigned to carry out the construction. The first step of the project, comprising some 7,000 households, was finished in 2011. The long-term goal is to connect 140,000 buildings with a potential subscriber base of 980,000 households and 70,000 businesses.
Case Study Russian Federation

CableRunner International is present in Russia via CableRunnerRus CJSC, a company founded to develop the CableRunner technology in the Russian market together with local investors. While CableRunner International supplies the CableRunner technology including training, know-how and material supply, the partners provide local know-how and access to local customers.

Pilot projects in Moscow and St. Petersburg have been conducted to gain a local footprint and to prove that the technology is applicable in the local sewer system just like it is in other countries - due to the similar structures that can be found worldwide. Based on the positive evaluation from Russian governmental and municipal bodies, the roll-out of the CableRunner technology is now prepared.

Pilot project St. Petersburg

The first pilot project in Russia has been constructed in St. Petersburg and comprises a length of approximately 1.5 km. By using the sewers of Vodokanal St. Petersburg (St. Petersburg’s sewer department) in a rural area, fiber connectivity for two separate educational facilities has been established.

Pilot project Moscow

In 2014, CableRunner cable trays have been installed for the first time in Moscow. The 4 km of fiber optic lines that were installed during the project connect the headquarters of Mosvodokanal with one of its subsidiaries. The route passes the main train station, one of the most crowded areas in Moscow and has been installed in pipes from Mosvodokanal as well as Mosvodostok, the local waste water and storm water departments.
Case Study Cleveland

North East Ohio Regional Sewer District asked CableRunner to connect one of their facilities through the sewers because traditional methods like digging could not be utilized due to local conditions.

The project was supported by a regional construction company that performed the actual installation on site after having received a technical and safety training conducted by CableRunner.

Selected pictures of installed cable trays in Cleveland
WHERE IS THE TECHNOLOGY IN USE?

- The CableRunner technology is proven and internationally certified. With the CableRunner technology, more than 2,000 km of fiber optic networks have been built in urban areas worldwide up to now.

- CableRunner is dedicated to product innovation and offers unique solutions for deploying fiber optic cable in accessible and non-accessible sewers in congested metropolitan areas. The company has partnerships with leading international telecom companies to develop customized solutions. CableRunner products and services have been used safely and successfully worldwide.
CableRunner also contributes to setting industry standards through ASTM International, one of the largest voluntary standards development organizations in the world.

**ASTM Standards for In-Sewer Fiber Development**
- ASTM Committee F36 on Technology and Underground Utilities developed Standards on Installation and Operation of Fiber Optic Cables in Existing Sewers.
- F2303: Standard Practise for Selection of Gravity Sewers Suitable for Installation of Optical Fiber Cable and Conduits.
- F2462: Standard Practise for Operation and Maintenance of Sewers with Optical Fiber Systems
Commonly Asked Questions about CableRunner and Our Innovative Fiber Technology

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A. General Background

A1. Who is CableRunner?

CableRunner USA, LLC, a Delaware limited liability company (“CableRunner”), utilizes an innovative technology to install fiber optic cable and related facilities in stormwater and/or wastewater pipes for the provision of competitive dark fiber services to fulfill urgent customer demand, to include both wireline (e.g., enterprise dark fiber) and wireless (e.g., 5G and network densification) applications.

A2. What is the background of CableRunner?

In 1996 the Sewer Department of the City of Vienna, Austria, pioneered the innovative fiber installation in the City’s combined stormwater/wastewater collection system. The CableRunner network in Vienna currently serves over 140,000 customers and has not experienced a fiber cut in over 15 years. Our patented technology is used in numerous countries around the world and recently has become available in the United States.

A3. What are the advantages of the CableRunner system?

CableRunner’s technology allows municipalities to leverage its existing infrastructure (its stormwater or wastewater system) to allow for faster, more secure and more cost-effective fiber deployment – without disrupting or damaging roadways (as typically
found with conventional excavation methods such as directional boring, open cut trenching and microtrenching), *without* adding to visual blight (as in the case of cable attachments to utility poles), *without* inconveniencing the public, and *without* compromising a pipe’s structural integrity or flow capacity.

**B. The Growing Need for Fiber**

**B1. Why is CableRunner interested in deploying more fiber in the City?**

Every sector of our society today demonstrates the seemingly insatiable demand for, and the critical dependence upon, reliable broadband access. Ensuring sufficient bandwidth for providing essential government services, e-commerce, telemedicine, remote learning, telework and anything “virtual” should not suffer because of common challenges in deploying fiber optic cable, most notably the traditionally high construction cost, which CableRunner has solved.

**B2. Who are CableRunner’s customers?**

The wireless carriers and fiber providers, who are among CableRunner’s dark fiber customers, prioritize allocating their capital budgets in jurisdictions where they can achieve both lower construction cost and faster “speed-to-market” as they seek to upgrade and expand their networks and service offerings, to include broadband, 5G, and edge computing, all of which would be advantageous to the City’s residents, businesses and visitors.

**B3. Who would own the CableRunner equipment?**

CableRunner would own the fiber optic cable and related facilities and would lease dark fiber to its customers, thereby maintaining a direct relationship with the City.
C. Jurisdictional Authorization

C1. What is CableRunner’s proposal to the City?

CableRunner has submitted a formal request to the City to secure access to its public stormwater (and/or wastewater) collection system and rights of way for the deployment and operation of fiber optic cable and related equipment.

CableRunner has developed a model form of right-of-way use agreement (already provided or available upon request) outlining customary terms and conditions, to include access, due compensation, indemnity, insurance, notification, and the like.

Monetizing the City’s stormwater and/or sewer drainpipes would avail a new-found revenue stream for the City, in the form of a franchise fee or linear fee (per the City’s convention for administering the public way). The City would have the option to convert such revenue into dedicated strands of dark fiber along the fiber route for its own non-commercial use that it otherwise would have to provision or construct, an appreciable value. For example, the City could connect desired endpoints which might be unserved or underserved by high-capacity fiber to fulfill strategic or operational objectives, such as “Smart Cities” and IoT applications, traffic and transportation, cameras, and resiliency.

C2. Could the City utilize the CableRunner system to satisfy its own connectivity needs?

CableRunner is open to exploring a potential public-private partnership or licensing arrangement whereby the City might use the technology to construct or expand its own fiber and/or conduit network(s), for lower construction cost and faster deployment.

D. Network Design and Engineering

D1. How does CableRunner approach project design, engineering and permitting?

At the project outset, CableRunner will consult with the City to discuss the project scope and seek its valuable input, drawing upon staff’s practical knowledge of the infrastructure, to include any past, current or planned repair, rehabilitation or replacement. CableRunner ideally would have access to the City’s records on buried infrastructure as we design and evaluate the fiber route. A preliminary project plan would be presented to the City for its review; if acceptable, we then would proceed with field
engineering and permit submittal, similar in process to that administered for other utility work in the public way.

As part of the field engineering phase, physical assessments of the pipe and its contents are made along the targeted route to determine suitability for the deployment of the CableRunner equipment. Any area of concern, such as pipe condition or excessive sediment and/or debris accumulation (i.e., sections in need of repair, clearing and/or cleaning), would be noted, and the findings of such inspection discussed with the City. If a section of pipe appears problematic, we simply would seek to alter the fiber route accordingly. CableRunner would advise the City on the extent of cleaning, clearing of debris and sediment, and root cutting, as necessary, and customarily evenly splits such cost(s) with a jurisdiction.

D2. What control does the City have over CableRunner’s fiber route and installation?

All work performed by CableRunner and its contractors in designing, installing and maintaining our fiber facilities would be done in conformance with plans approved by the City and in compliance with the City’s applicable codes and regulations. The City retains final approval of the fiber route and installation through its own permitting authority.

D3. Does CableRunner perform pre- and post-inspection condition assessment of each pipe segment?

Inspection and video photography of the pipe along the projected route are performed during the design and engineering phase, and again post-installation, for documentation purposes.

E. Installation Basics

E1. What fiber facilities is CableRunner proposing to install?

CableRunner has two types of modular cable trays and respective methods of installation. For pipes between 8 inches and 30 inches in diameter, the “Non-Accessible” modular cable tray, measuring approximately 1⅛ inches by 2⅝ inches, is installed robotically, typically in the crown section of the pipe. This installation utilizes one TSM 6mm x 50
mm stainless steel screw anchor to attach the cable tray to the pipe wall approximately every three feet.

For pipes larger than 30 inches in diameter, the “Accessible” modular cable tray, measuring approximately 1½ inches by 3⅜ inches, is installed manually, typically in the apex section of the pipe and above the highest flowline, if possible. This installation utilizes one Hilti CR 10mm x 80mm stainless steel screw anchor to attach the cable tray to the pipe wall, likewise approximately every three feet. The HDPE conduits inside the cable tray are held in place with a mounting clip, through which the screw anchor is designed to be placed. Additionally, an omega bracket supporting the cable tray is attached to the pipe wall with two of the same screw anchors, also approximately every three feet but staggered in sequence from the single screw anchor. CableRunner is proposing to install one modular cable tray at the present time.

E2. Does the screw anchor fully penetrate the pipe wall?

The specially developed screw anchor mounting method does not fully penetrate the pipe wall (except in the case of PVC pipe) and minimizes the pressure of displaced material that is normally placed on the pipe when using regular drilling techniques. The screw anchor immediately seals the drilled holes, alleviating the need for sealant or epoxy.

E3. Can the modular cable trays be installed in all types and condition of pipe?

The CableRunner system can be installed in most common types of buried pipe, with corrugated metal pipe being the least desirable.

E4. How does the CableRunner system exit the system to serve its dark fiber customers at the surface?

To facilitate a fiber lateral for a dark fiber customer, flexible stainless steel conduit is used to transition the fiber optic cable from the backbone installed within the pipe system up through a manhole or catch basin to a designated surface endpoint, which typically is a handhole set in the sidewalk in the public way.
F. Operational Matters

F1. Does the modular cable tray cause pipe obstruction?

Constructed of PVC plastic and resistant to hydrogen sulfide gas, the modular cable trays have a smooth exterior surface and are designed to offer no resistance so as to prevent build-up and blockage. Since debris usually travels along the bottom of a pipe, the CableRunner installation will not materially affect flow capacity or cause an obstruction due to its attachment elevation on the pipe wall.

F2. Would the CableRunner system affect the City’s ability to perform maintenance on the pipe system?

In the event of scheduled or non-emergency pipe cleaning, maintenance, repair, or replacement, CableRunner would coordinate such work with the City. For emergency work, we typically have a four-hour response time. To enable the City’s access for repair or maintenance of the pipe, CableRunner would work with the City to relocate the affected section of its fiber facilities, where necessary, either temporarily or permanently, at our expense. High-pressure power washing and clearing will not be impeded by the presence of the CableRunner installation, which itself can withstand such high-pressure power washing.

F3. Does the CableRunner system require much maintenance?

Once installed the CableRunner system generally does not require much maintenance. Additional fiber optic cables and microducts are inserted into the modular cable tray as needed. If maintenance on the fiber facilities is required, CableRunner will attempt to provide as much advance notification as practical.

F4. Are typical cleaning methods utilized for pipe cleaning, *e.g.*, jetting, rodding, root cutting, *etc.*, limited with an interior cable installation?

Regular pipe cleaning and clearing should not be impacted by the presence of the CableRunner fiber facilities, which itself can withstand high-pressure power washing. By design, little can withstand a root cutter, and CableRunner temporarily would remove its
fiber trays from pipes where such rodding or root cutting is required and re-install after the cleaning.

F5. What is the estimated operational lifespan of the CableRunner fiber facilities?

The fiber optic cable and modular cable tray are expected to last for decades under normal conditions.

F6. Does the CableRunner system affect the structural integrity of the pipe system by drilling screw anchors into the pipe wall?

The structural integrity of the pipe should not be affected by the CableRunner installation. The specially developed screw anchor mounting method minimizes the pressure of displaced material that is normally placed on the pipe when using regular drilling techniques. For pipe material or pipe sections which may not be suitable for installation, CableRunner will reroute the fiber path.

F7. Are there any chemicals or hazardous materials present in fiber facilities or fiber optic cable or used during installation?

No.

F8. Will the fiber optic cable interfere with the signal strength of CCTV and other video equipment (e.g., sonar or ground penetrating radar)?

No.

F9. Is notification to CableRunner required for routine or emergency sewer maintenance activities? Will a CableRunner representative need to be on-site for these activities?

Preferably yes to both, depending upon the nature and extent of the maintenance contemplated.
F10. How are CableRunner’s fiber facilities maintained after installation?

The CableRunner system generally does not require much maintenance once installed. Additional fiber optic cables and microducts are inserted into the modular cable tray as necessary. In the event the City notices a maintenance issue with the fiber facilities, CableRunner would respond promptly to correct or repair the issue.

F11. Will CCTV be done before and after maintenance and submitted to City for review to ensure no damage to the pipe system? In the event of pipe damage, will CableRunner repair the damage at no cost to the City?

Video photography (CCTV) of the pipe system along the fiber route generally is not necessary when maintaining the CableRunner equipment. However, should CableRunner perform CCTV in the course of maintenance, it would provide the City with such footage. Video photography customarily is performed pre- and post-installation for documentation purposes. CableRunner would be liable for damage and repair to the pipe system reasonably and directly caused by the installation or maintenance of its fiber facilities.

F12. Would CableRunner’s installation affect the City’s ability to line the pipe in the future?

A pipe liner can be applied over CableRunner’s fiber facilities, once installed, and all standard liner types can be used.

F13. Are there situations where sewer bypassing for maintenance activities is needed?

Depending upon certain conditions, sewer bypass might be necessary at the time of installation for a brief period of time to provide adequate access.

F14. If the fiber facilities create a blockage arising from pipe debris, such as tree limbs, leaves, trash, or other material, who is responsible for removing the blockage?

The CableRunner equipment has a smooth exterior surface and is designed to prevent debris buildup and blockage. Since debris usually travels along the bottom of a sewer pipe, the CableRunner installation does not materially affect flow capacity or cause an
obstruction. However, if a blockage does occur, and the cause can be reasonably and directly attributed to the fiber facilities, CableRunner would be responsible for removing the blockage.

F15. Can CableRunner facilities be installed in supercharged sewer systems?

Installing CableRunner facilities in a supercharged sewer system simply involves temporarily lowering the water level in the sewer or alternatively shutting down the sewer line segment. The presence of water in the line does not impact the functionality of the CableRunner facilities, since the fiber optic cables are housed within microduct (i.e., blow tubes) for the robotic installation method and again in conduit for the manual installation method.

F16. In the event of discontinuation of the CableRunner service, would CableRunner remove all of its installed facilities at its expense?

Our model form of right of way use agreement specifies that CableRunner would be responsible for the removal of its facilities upon termination of such agreement.

Additional information is available at www.cablerunner-usa.com, to include several illustrative videos.