

Conduit Infrastructure Provides Base for Smart Grid And Broadband Access

The municipal utility in Estes Park, Colorado, solved a difficult fiber deployment challenge by using aerial conduit with multiple pathways for its smart grid. Now, if the town decides to build an FTTH network, the conduit is ready and waiting.

By Molly Gilbert / *Dura-Line Corporation*

Estes Park Light and Power is poised to bring broadband to the town of Estes Park, Colorado. Today, many communities call high-speed internet the “fourth utility,” after water, gas, and electricity. High-speed internet access is required not only for work but also for day-to-day life – scheduling doctor’s appointments, checking homework assignments, even researching which government office to contact about barking dogs. Research repeatedly shows that communities that have access to broadband provide better employment opportunities, attract more entrepreneurial investments and have higher citizen engagement.

The town of Estes Park recognized the need for high-speed broadband, and community leaders spent considerable time and resources researching their best options. Working with local leadership, consultants and regional partners, the community is in the final phases of deciding whether to establish a high-speed fiber broadband network offered through Estes Park Light and Power, its municipally owned utility. With a positive reputation for quick and efficient service and response time, Estes Park Light and Power serves about 11,000 customers in an area of 350 square miles.

According to the Estes Park Broadband Expansion and Technical Assistance Strategy Report, which consultant NEO Fiber prepared in 2015, “Abundant broadband is a necessity for economic vitality. The economic health and survival of this region depends in large part on the availability and affordability of advanced telecommunication services. Advanced broadband is no longer a luxury. The internet and its uses have infiltrated every area of our lives.”

The report continues, “Communities that lack adequate broadband services are finding a disparity between the ‘haves’ and the ‘have-nots,’ and without sufficient broadband capabilities, find their people and local businesses leaving the community. Broadband must be abundant, redundant and available to everyone.”

The community had already experienced life without connectivity. In fall 2013, a flood wiped out the local telecom company’s fiber, leaving Estes Park without phone, internet or 911 services. For public safety reasons alone, stakeholders agreed that re-establishing and creating redundant communications paths in and out of the Estes Park area were important goals. In addition, Estes Park hoped to use a broadband network to foster a business climate conducive to innovation and creativity.



Estes Park's location, though beautiful, makes fiber installation difficult.

However, no other providers stepped up to provide modern, competitive broadband. Estes Park reached out to private firms to assess interest, but they answered that the projected return on investment was too low because of the rural population base.

BUILDING THE SMART GRID

Whether or not the town builds broadband for its citizens, the municipal utility needed fiber to manage its electric grid more intelligently, and in 2015, it decided to go forward with a fiber build for a smart grid. This would allow for two-way communication between components of the electrical infrastructure, resulting in more efficiency in the transmission and delivery of power to customers, quicker restoration of power after outages and better integration of renewable and customer-generated power.

But even that limited project wasn't easy. Estes Park is known for its rugged terrain, in which extreme

changes in elevation levels are paired with harsh winter weather, including wind, snow and ice. These natural conditions created unique installation challenges, so burying fiber optic cable in conduit was not a perfect solution, even though it works in other parts of the United States.

Estes Park Light and Power determined that it could use its existing utility poles for a smart-grid capital improvement project, but aerial installation, too, presented serious challenges, including multiple crossings of rivers and highways. "We are in the Rocky Mountains," says Joe Lockhart, line superintendent for Estes Park Light and Power. "A lot of our poles are still being climbed. We have only 40 percent access. We just can't get to them with a bucket truck because they are up on the side of a mountain."

This installation difficulty was anticipated in the NEO Fiber report, which stated: "The town of Estes Park has higher than average capital costs due

to being both located in the mountains with rocky conditions and in a rural area with a relatively low customer base."

According to Lockhart, the utility spent a year investigating various options, looking for a way to install a network while saving on cost and person-hours. Traditionally, strand and lash techniques are used to mount aerial cables. "A cable company will put a steel guide wire, or support wire, in place and then come back and install fiber optic cables, and then come back with a machine that connects the fiber to the steel pole – that's three things you have to do," Lockhart says. "It's a cheap product to buy, but the man-hours add up."

Instead of using strand and lash, the utility made the decision to use small-diameter conduit for its smart-grid project. With this type of technology, an in-house, four-person crew trained in fiber splicing could handle 100 percent of the project. "We are pulling in about 10,000 feet a week. That



These pulley guides control the route for the conduit as it is being installed.

doesn't seem like a lot if you were in Kansas, where it's flat and straight. We had to cross the river four or five times and cross the highway four or five times," Lockhart says.

Estes Park Light and Power chose a Dura-Line product called FuturePath Figure-8 Self-Support Aerial Conduit. With 11 U.S. manufacturing facilities, Dura-Line is a leading international manufacturer and distributor of communications and energy infrastructure products

and systems, including conduit, cable-in-conduit pipe, and accessories. Dura-Line's Figure-8 standard self-support duct has been in use around the country for more than 30 years, and the new FuturePath Figure-8 Self-Support option allows for a flexible, expandable network with dedicated, easily identifiable pathways for system upgrades, redundancy and future capacity. With seven pathways bundled inside one conduit, the utility now has additional capacity to help support a

PROJECT HIGHLIGHTS

The Estes Park fiber project consists of 70 percent overhead and 30 percent underground deployment. The initial project phase was 7 miles down Highway 34 in Colorado, from Estes Park to Loveland. To date, more than 100,000 feet of Dura-Line's 7-way 12.7/10 mm FuturePath Figure-8 Self-Support Aerial Conduit has been used, and Estes Park anticipates using microtechnology for its potential fiber-to-the-home build as well.

Installation techniques include aerial, microtrenching, overriding, plowing, and boring regular FuturePath conduit. After dead-ending the FuturePath Figure-8 Self-Support cable, each strand will be brought down the utility pole to a handhole to allow for secure access. To continue the run without using a handhole, the utility uses track enclosure and coupling mid-span to maximize fiber cable distances close to 15,000 feet. This allows it to break out a single microduct for drops to homes, businesses or wherever needed. In the initial deployment of fiber, Estes Park was able to air jet 11,500 feet in a single shot, above average for even an underground application.

broadband network, should the town decide to go forward with that project.

As of mid-2018, thanks to the smart grid, the utility can remotely read about three-quarters of the meters on its system. It hopes to be able to read all its electric meters by 2020 and all its water meters by 2023.

MAKING SPACE FOR BROADBAND

Estes Park Light and Power chose to use individual dead ends, or terminations, for each of the seven pathways, creating easy access through separate handholes. "It makes the vault cleaner, and if we were to lease it out, then somebody isn't in our vault," Lockhart says.

It is now in a position to create multiple revenue streams with each secure, color-coded pathway. "Those tubes go quickly," says Lockhart. "Our trunk line is 144 fibers, so seven tubes can go really fast. If we were in a large city, I could definitely see 14 up in the air and all of them being used."

Lockhart estimates that a traditional installation with a contractor would have cost \$18 per foot, but his in-house costs were closer to \$7 per foot. "If we can save \$3 or \$4 million on man-hours, that's a big deal. It's not just installing; it's maintaining. We are saving in the long term, also."

Easier maintenance provides immediate and future cost savings. Trees blowing through the power line are an ongoing issue. "If a tree hits the strand and lash, the lash comes off and unravels. The wind will blow the lashing into a power line, and that causes a power outage," Lockhart explains.

"With one duct bank in the air, it is faster and easier to push fiber through," Lockhart adds. "If you have FuturePath, you only spend time once to put it in the air – which involves permits and traffic control – and then you just go to a vault and push the fiber through. There's no additional traffic control, we're not disturbing people's landscaping, and this is several thousands of dollars cheaper. If we can save money, then that's what we are trying to do."



Installed conduit with tensions at a "double dead end" used when routes change direction.

In spring 2018, Neil Shaw, founder of Uptown Services, a Boulder-based consulting firm, presented the Estes

Park Town Board of Trustees with several financial outcome models for broadband based on different speeds,

market penetration, and the length of time it would take to break even with the cost of construction and implementation. Similar communities have found the "sweet spot" scenario with 40 percent penetration and monthly user charges of around \$70. The Estes Park Town Board of Trustees is expected to take action later this year. If the trustees decide to go forward with a broadband network, the Estes Park Light and Power infrastructure will be a great asset that the community can use to deploy services quickly. ❖

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