Lessons Learned: Nashville's Google Fiber Coordination Efforts

By: Craig Ingram, Public Awareness Manager, Tennessee811

In 2017, Tennessee811's Nashville-based call center processed 808,139 locate requests, each representing as much as 2,000 linear feet of excavation. That's an increase of nearly 10% over 2016, which was already an increase of more than 16% over 2015. Fiber deployments account for a significant percentage of the state's ticket volume, and large fiber projects like those of AT&T, Comcast, and Google Fiber are ground-breaking (figuratively and literally) in scale of work and speed of installation. In the race to connect fiber to the home, these players and their competitors often have an overwhelming effect on the resources of local utility operators attempting to prevent damage to their existing infrastructure. Deliberate and systematic coordination efforts are key to any fiber build where success is measured, in part, by a low occurrence of damage and related service outage.

In February of 2014, Google identified nine metro areas where conversations had begun to "explore what it would take to bring them Google Fiber." Google's promise of competitive pricing and industry-leading connection speeds encouraged cities like Nashville, who acknowledged the important role of broadband connectivity in economic development, to vie for attention. An announcement in January of 2015 solidified Nashville and four other cities as destinations of upcoming fiber builds, and prompted Tennessee811 president, Bill Turner, to reach out to contacts in existing Google Fiber markets regarding their experience during deployment. Though each locale presented its own challenges, there was a consensus that if you don't get ahead of a project this size, you'll never keep up.

> "Contract locators have their fingers on the industry pulse in a way that most of the rest of us don't...they develop relationships with a broader range of excavation crews."
>
> -Craig Ingram

Finding a solid contact in a corporation as large as Google was a daunting task, but months of outreach via telephone and email eventually led to an exciting development: the promise of a face-to-face meeting. As the meeting date approached, so did the winter storm unofficially known as Thor. Thor dumped record levels of snow in Kentucky, and covered parts of middle Tennessee in a blanket of white, dense enough to bring greater Nashville to its knees. Rescheduling our meeting with Google Fiber would have been advisable, but the fear that we would miss a critical and narrow window was enough to keep us steadfast in our resolve. We were pleasantly surprised when representatives from Google Fiber slid into the parking lot of Tennessee811, stomped the snow off their boots, and pulled up a seat at the conference table.

Google's presence at that initial meeting, especially considering the treacherous weather, demonstrated a level of commitment that we didn't expect, but that we were grateful to see. Conversation began with a discussion of the struggles faced in other deployments, primarily Kansas City, and what was needed to avoid repeating some of those same mistakes in Tennessee. We stressed the importance of open lines of communication between relevant stakeholders, including contract locators, a party whose role in coordination is often diminished or overlooked.

Contract locators have their fingers on the industry's pulse in a way that most of the rest of us don't. Particularly in metropolitan areas, these locators are responsible for marking more than one utility type at a given location, which can mean they spend more time on a job site than a utility employee responsible for a single facility type. The same reasoning can mean that their territory of responsibility is larger than a utility counterpart, which means they develop relationships with a broader range of excavation crews. Hopping from site to site, contract locators pick up on work schedule changes and project details that aren't recorded in emails or other formal documentation.

Contract locators also have skin in the game. Because they're responsible for multiple contracts and utility types, they need time to augment their staff in preparation for a surge in demand. When the number of incoming locate requests increases 68% over the previous year (Figure 2), trained locators aren't just waiting in the wings. There's no temp agency with trained locators on standby whose production numbers will be where you need them on day one–it takes time. But over time, and with the appropriate Non-Disclosure Agreements, Google Fiber recognized the importance of bringing contract locators into the conversation. They need information to stay ahead of excavation crews, and they offer insight from a useful perspective.

With incumbent utilities and contract locators on board, the excavation contractors were the only missing piece. On a project of this size, understanding the hierarchy of Google's contractors was critical to understanding who should be contacted for what stage of work. From the engineering and project management firm, to the master contractor, to the multitude of subcontractors, the list was long and constantly changing.

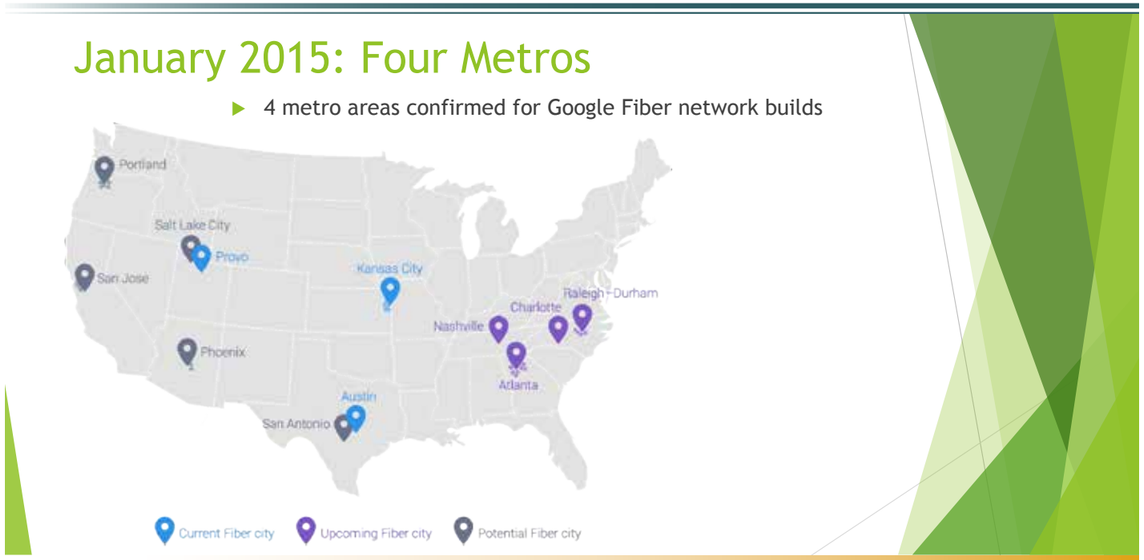
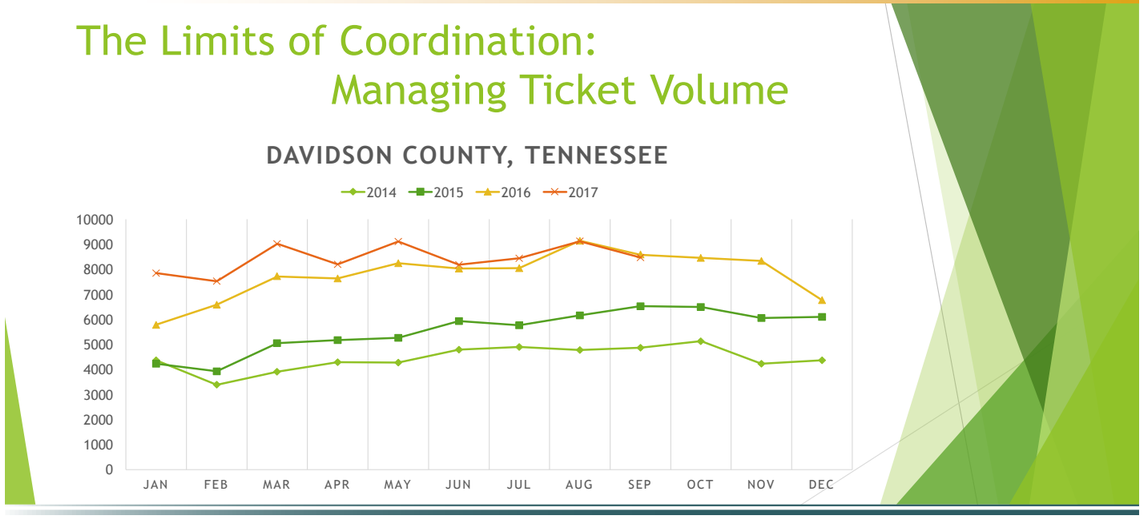


Figure 1: In Jan. 2015, Google announces Nashville and four other cities as destinations for fiber builds

Horizontal Directional Drilling (HDD) crews were coming from across the country in search of work, and we'd even heard of entrepreneurs with little or no experience gambling on the expense of a drill after they'd been told there's money waiting on anyone with the manpower and equipment available to pull conduit. Crews that had never worked in Tennessee, who didn't know our tolerance zone is the width of the line plus 24 inches, or that our state requires three working days' notice prior to excavation, were being tasked with thousands of feet of boring in unfamiliar soil hiding unforgiving rock.

Between April and June of 2015, we worked with Google Fiber to train their master contractor in ticket entry and legislative requirements. Orientation programs were established, in cooperation with the local natural gas distributor, to bring new subcontractors up to speed. All project personnel had to be credentialed to enter a job site, and everyone had stop-work authority in the interest of damage prevention and safety. Weekly coordination meetings began, where work packages were revealed, and issues were resolved

Figure 2: Incoming locate requests increased 68% over the previous year in Davidson County TN from Feb. 2015 to Feb. 2016



How Valuable are Professional Locators?

Every spring, major league baseball players travel to Florida and Arizona to work on the fundamentals of the game. They spend six weeks or more practicing the basics–hitting, fielding, pitching, catching, strategy, and teamwork. They do this even though they have already achieved the pinnacle of success in their field. The average major leaguer earns $4.5 million per year. Roughly 1,200 players are able to reach this level–each of the 30 teams will have 40 players on their roster.

Steve Nichols - Radiodetection

On average, each team is spending $180 million on salaries for professional baseball players. They only pay that kind of money for players who are the best they can find. These players have managers who help them hone their skills by doing the correct things over and over. The manager's goal is to make it almost impossible for their players to fail at the tasks they need to perform.

A common definition of a professional is someone who does a job that requires special training, education, or skill. Playing baseball at the highest level is not a simple job that just anyone can do. To maintain the level of proficiency required to be a professional at the highest level, baseball players know they have to continuously improve their skills through weeks of practice, or risk falling behind and losing their place on the roster.

Locating underground utilities shares something in common with baseball. It is also not a simple job that can be done without the best technology, training, and skills. We know this from the data contained in the DIRT Report from the Common Ground Alliance. This report tracks excavation damages and identifies root causes of damages. According to the latest DIRT Report, 87,000, or 23% of reported damages in 2016 were assigned the root cause of "Locating Practices Were Not Sufficient." At the DIRT Report average cost per damage of $4,000, this equates to $348M in excavation damages that could have been avoided with better locating practices.

There are two important conclusions to draw from the DIRT data. First is that locating is not a simple task that can be easily performed by someone with inadequate or outdated technology. In fact, it is a challenging job that presents difficult situations such as distortion and congestion on a regular basis. Everything being located underground is invisible to the technician and must be identified using modern technology that does the best job of identifying electromagnetic fields in confusing situations.

The second conclusion is that learning how to address the variety of situations when locating is a continuous process. Professional locators, just like professional baseball players, must continually learn new and better ways to overcome the challenges they face. Training on how to use the best modern technology is needed on a regular basis. Baseball players don't go to spring training every year because it's fun; they go because learning new and better skills is necessary to their success. Professional locators, and their managers, need the methods and training that make it almost impossible to fail.

The opportunity cost of not having professional locators and managers is $348 million in avoidable damages. Just think, with that money you could pay the salaries of nearly two professional baseball teams. Pretty amazing.

Author Steve Nichols is Area Sales Manager for Radiodetection. Visit www.radiodetection.com/en-us to learn more.

How Things Work

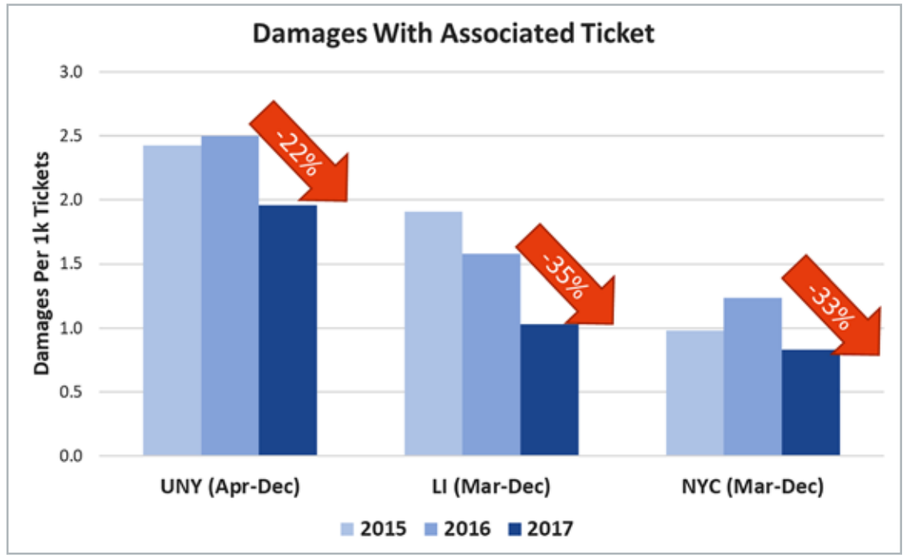
Winning the Game

Predictive Analytics Evens the Odds for Damage Prevention

In the movie *Moneyball*, based on Michael Lewis's 2003 book "Moneyball: The Art of Winning an Unfair Game," the Oakland Athletics knew that they could not compete monetarily with the New York Yankees. The Yankees could outspend the A's by more than ten to one. Oakland needed to be more efficient with their resources, so they used statistical analysis to show how past performance would predict how to put together the best team with the budget they had available. Wouldn't it be great if we all had damage prevention budgets like the New York Yankees? Unfortunately, financial incentives in the utility industry generally encourage reduction of operating expenses, not increases. As a result, most of you probably feel more like the Oakland A's.

Figure 1: Several recent examples show that predictive analytics can be a successful technique. Utilities are using predictive analytics to mitigate risks in the field and having great success.

The following chart compares damage reduction per 1000 tickets in Upstate NY, Long Island and New York City following implementation of ticket risk analytics to best channel available damage prevention resources.



The story has become a foundational tale of how best to use data to improve business outcomes. From professional sports to social media customer engagement to e-commerce, the era of "big data" is providing many opportunities for predictive analytics to get better results with fewer resources. How can we apply this approach to damage prevention?

In the damage prevention industry, the Call 811 initiative has significantly lowered damage rates over the past 15 years. However, the statistics show that damage rates are plateauing. Damage prevention teams are now looking for ways to continue to lower their damage rates (just like the Oakland A's evening the playing field). Several recent examples show that predictive analytics can be a successful technique. Understanding where your damages are coming from is important, however, it is just as important to understand where your damages are GOING to come from. If you could predict the best place to focus your available resources to lower the risk of damages, you would do it. The technology exists today and has been proven very effective in the field. Utilities are using predictive analytics to mitigate risks in the field and having great success. (See Figure 1 above).

> "Understanding where your damages are coming from is important, however, it is just as important to understand where your damages are GOING to come from. " *-Matt McHugh*

Predictive analytics works in the damage prevention industry by identifying which one-call tickets are most likely to lead to damage, and have the highest consequences if damage occurs to the assets in that area. These combine into an overall risk score for each ticket (probability of damage times consequences of damage). Results have consistently shown that over 50% of damages come from tickets ranked in the highest 10% for risk by one of the leading predictive analytics engines.

As a result, each stakeholder in the damage prevention process can use the risk score with confidence to make best use of their available damage prevention resources. Utilities can force field checks on high risk tickets that might have otherwise been screened in the office. Locators can assign their most experienced technicians to the highest risk tickets. Utilities can audit locate marks or set up meetings with excavators at high risk sites. Positive response messages can be tuned based on assessed risk of each ticket. Everyone can focus their messaging, human resources and time more efficiently if they can better understand which tickets have the highest risk.

Why is this important today? A recent report to Congress on Improving Damage Prevention Technology (See p.) includes a specific recommendation to "evaluate and implement predictive analytics tools which use data to identify and proactively address high-risk excavations." Numerous conference presentations and papers are discussing this matter. Damage prevention teams are working extremely hard to reach the ultimate goal of zero damages. Predictive analytics is a proven, effective tool to help this quest. The Oakland A's had the best record in baseball using predictive analytics, and many other sports franchises have followed their lead (see Boston Red Sox). Shouldn't you strive for the best record in damage prevention using the same techniques?

Learn more about Opvantek's Integrity Management and Damage Prevention Software for the Utility Industry at www.Opvantek.com.

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THE ROUNDTABLE Transcript

2017 REVIEW

Michael Frye—Division Controller, Leica Geosystems
David Kelly—US Radar
Alan Haddy—President, UTTO

One of the main themes that emerged from the most recent Roundtable was technology, and how it will force change in the damage prevention industry. The consensus is not if these changes will happen, but when will they happen, and how soon. Some major technological innovations are occurring as we speak, and having representatives from three major tech-based companies discuss these changes was an illuminating and eye-opening experience. Here we transcribe the Roundtable featuring Michael Frye from Leica Geosystems, David Kelly from US Radar and Alan Haddy from UTTO. Their discussions and debates on current technology trends and where they will be heading, offers a fascinating glimpse into the future of our industry.

What is your vision of how a detection instrument will look like in the future and how that will add another dimension for excavators and utility planners due to the power of the information and data collected?

Alan:

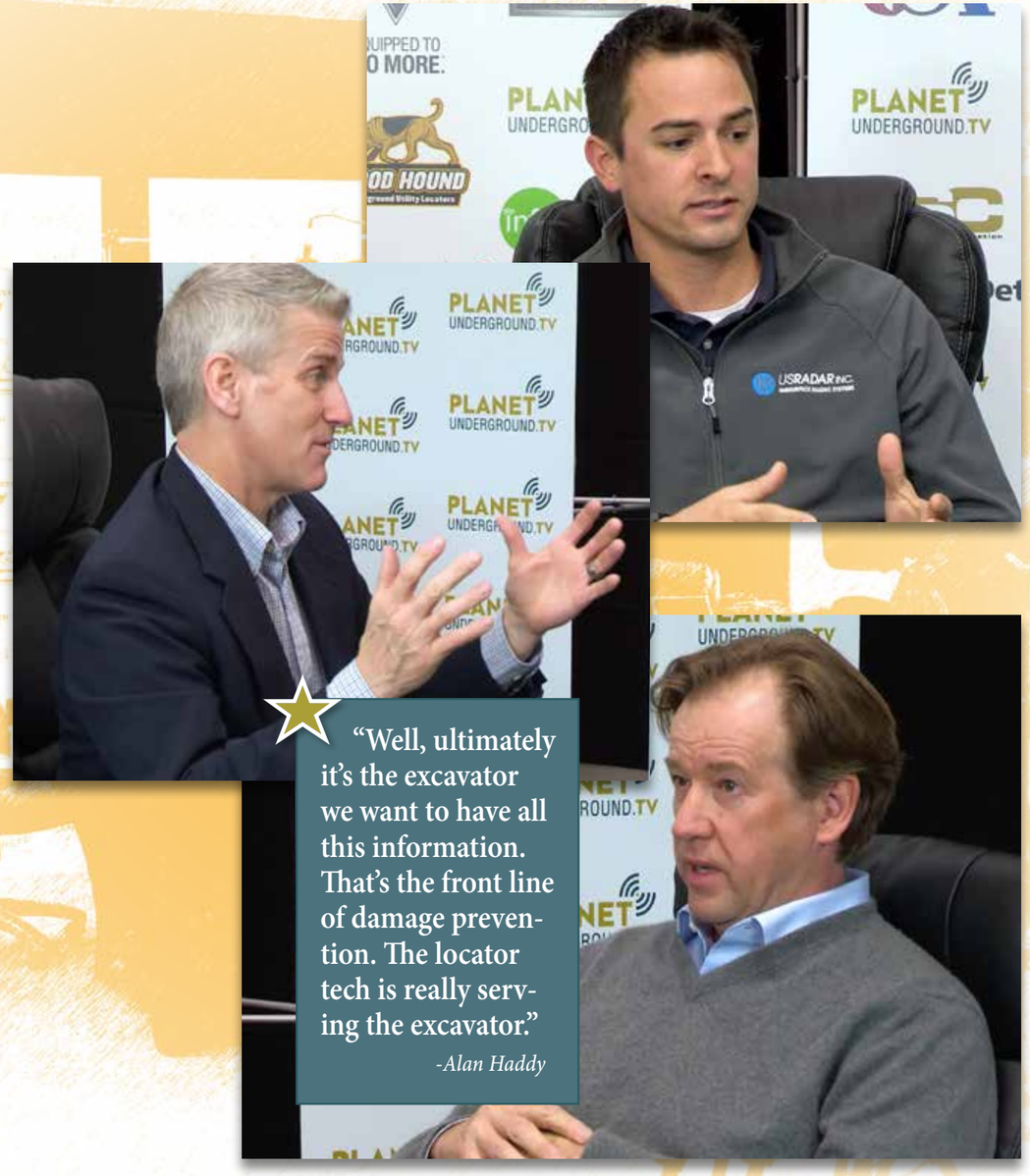
So, historically with locating devices, we've had the lone wolf technician out there with a device, who must be taught. He is skilled with difficult task, he's in a really difficult environment with multiple tasks and facilities he has to locate. He's out there on his own. We see the next generation of equipment connecting him into the whole process and his support staff. We think that the optimal way is to connect that device to the field tech, the ops manager, and the GIS team. This occurs by the transition of just marking and locating, to: marking, locating and capturing that point and then turning that into data into information that can be used in the future. We're working with all the device manufacturers to push towards that data model, capture and reuse. Management is the concern, moving data from device to cloud and back without interfering the workflow, the main challenge is that motion. Are any of you guys working on those issues?

Michael:

We are at Leica, we have software packages coming out that will do that. It is important once you have the data, to know what to do with it, and how can you use data for the future to make it powerful. We have DX manager – the people out in the field have input on that, and how it goes to cloud then to the office.

Alan:

We've run into issues with generating volumes of data, such as depth, frequency, current, and GPS measurements, and keeping it manageable. We saw one customer who had 600 field techs using field equipment for



"Well, ultimately it's the excavator we want to have all this information. That's the front line of damage prevention. The locator tech is really serving the excavator."

-Alan Haddy

Top: *David Kelly, US Radar*
Center: *Michael Frye, Division Controller - Leica Geosystems*
Bottom: *Alan Haddy, President - UTTO*

Mark Olsson

President - SeeScan

Thoughts on future technologies such as 3D mapping, LIDAR, and artificial intelligence...

The world keeps changing, so if you're going to need to keep your 3D model fresh. The utilities in the ground don't move, unless somebody moves them. So once you identify where these are, that data is forever, unless there's an earthquake, or somebody moves them, goes along and does some digging. But the trees, the roads, buildings, all the surface manifestations are constantly in flux. So what is the accuracy of the 3D model? Im not saying 3D is not good, but the value may be perceived to be greater than it actually is given the cost.

I'm guessing 10 years from now the role of the operator may be insignificant. The operator will be called AIs. Talking about identifying conflicts, or even designing…taking a fiber line from point A to B…using the data. A human will have to review it, but the AI can look at hundreds of times, or thousands or millions of times more information as a human can do instantaneously. It will be potentially a brave new world in ways that will be surprising.

About the operators, locators of the future…what skills will they need to best utilize complex data and equipment?

There is a field component that will be somewhat different than it is now. What will change is you wont' be interpreting the signals from the instrument to decide where to put the paint. I think that whole part of the problem really needs to go away. There's too much discretion. In order to do mapping properly, you have to collect data real time from all these different sensors in a way that is completely beyond human comprension of all the data. Maps may really appear post process.

The instrument will interpret and present where it thinks the utilities are. The person in the field still has to decide how they'll isolate and access the utility. The experience of locating will take a different kind of expertise, like interacting with a lot more software compenents, more complex systems. You might be locating multiple types of utilities all at the same time. There may be alternate ways of collecting data, such as flying drones. You must understand utility infrastructure so you know how to connect and interact with it in congested areas.

L to R: Mark Olsson, Steve Reinks (American Survey & Engineering), Neil Costello (VAC Group)

PLANET UNDERGROUND.TV

THE ROUNDTABLE Transcript

2017 REVIEW

Tim Ayers—Director Operations, Health & Safety - INTREN
Cory Mass—Applications Engineer, Underground Solutions - Vermeer
Eric Swartley—Sr. Manager, Pipeline & Public Safety - UGI

In this Roundtable session, we put together an excavator, an equipment manufacturer and a utility safety director together, and filmed as they discussed: the challenges of a crowded underground, the use of increasingly more advanced heavy equipment to help meet those challenges, and the training advances involved in integrating more high-tech methods of equipment maintenance and monitoring. As always, they mutually concurred that the goals of any new technology should include improved safety first, and then productivity.

We bring you an excerpt of the full transcript mid-conversation...

Tim:

We're putting all this cable into the ground and just leaving it there, abandoning it. It's making it hard to locate, hard to do our jobs. We're running out of tolerance zones and easement, so I wonder if anyone has looked at pulling that stuff out of the ground and mining it, recycling it, freeing up that space?

Cory:

You're right, utilities have been abandoned, and people don't know where they're at. So we're having to be a lot more precise with our placement of HDD or even open cut installations. There's a lot more work on the front end with planning, and then a lot more re-work during the job.

Tim:

A lot of times I think the guys figure in that safety factor, and they work right up to it. It's certainly not something we encourage–we try to steer away from that. I imagine we destroy a lot of your equipment (Cory), and that's probably one of your pet peeves. I know my son works in the shop at our company as an intern and that's something he's learning, how hard the guys use the machines. It's easy for us to be critical of that, but we're also probably pressuring them to be productive. And you know, they are just trying to get the job done. They take a lot of pride in what they're doing, but at the same time they're working really hard out there and they're trying to get the job done quicker and more productive every time. We need to make our equipment 'bulletproof' so they can live within those safety factors and still get the job done.

Cory:

And it's tough. From a design stand point, we've gone over a lot of different changes over the years to try and make things more reliable so that the contractors, when they're installing products, they can rely on the machines that much more. But as you point out, as you've seen, people run the equipment very hard. Sometimes there are things we can't account for, but every day we're trying to understand what those are and account for them as we go forward.

Tim:

We've gone through a couple iterations on the GPS for trucks. One that we implemented not only now has GPS, but it has the points on your truck to inspect to make sure that your equipment is good to go, and makes paperless logging of your inspections. One thing that I've heard about recently though, is it doesn't actually go past the trucks and get to the equipment, so while we do an inspection of our trucks through this tool, we walk through an inspection as we remember how to do it, on our equipment.

And you know obviously for this equipment, this high-tech stuff, it goes through a lot of abuse, so there are things about the operation that our employees need to learn to make sure that it's ready to be used today. As its operating, if they get feedback on how it's being used, they might react better if they understood problems before they actually shut down the machines.

Eric:

You mentioned the tool you're using to enhance the level of experience that people have. That's one of the challenges of bringing new workers in, you can't train experience. You can give them the education, but a year's experience takes a year, unfortunately, in that scenario. The other thing that probably parallels technology, especially in the last 30 years I've been in it, is the focus on safety–the employee and public safety component. Technology has really helped to achieve a lot of enhancements in the safety area, as well as in the productivity arena.

Tim:

Well you know, it's also important keeping people like myself getting out in the field, and seeing what's going on, so that I remain educated. It's been a long time since I've been out in the field, and just trusting these guys to be out there working is probably not the right thing. I think you need to get out there, and find out what their hardships are, and then it's our job to eliminate those hardships, eliminate the barriers so that they can stay productive.

Cory:

One of the things at Vermeer that we've done–I mentioned the training classes and programs we have–but we've also created an HDD simulator. It's the actual operator station off a directional drill, and at Vermeer we keep the bulk of our operator stations very similar, if not exactly the same. So, with this simulator, you can put operators in there and they can start learning the repetitive practices of the drill, learning the concepts of horizontal directional drilling before you put them out on one of those $500,000 pieces of equipment where they could do some real damage. They're not using up hours of warranty, not using fuel, just a little electricity, and they're able to do it in a more controlled environment, versus on the machine where they could potentially get injured.

They can now do this in a classroom setting, but they're still getting that muscle memory, that motion control, learning the ins and outs of operating the drill on a regular basis. We see that as a big benefit to customers starting to bring in new employees, as you said, out of those apprenticeship programs, who maybe have a little bit of exposure, but not a lot. They're able to start using those tools and learn how the machine operates before they have to go out in the cold weather where they may be more prone to have an accident before they've had enough training.

> "[Our people] are working really hard out there, trying to get the job done quicker and more productive every time...we need to make our equipment 'bulletproof' so they can live within those safety factors and still get the job done."
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