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"Smart Construction: Increasing Opportunities for Small Businesses in Infrastructure"
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Good morning, Chairman Golden and Ranking Member Stauber.

My name is Chris Shephard, and I am the Vice President for the Construction Solutions Group at Trimble. Headquartered in Sunnyvale, California, Trimble is a global technology company focused on transforming the way work is done through the use of intelligent, integrated technologies and innovative solutions.

About Trimble:

Across industries and around the world, Trimble innovation enables economic breakthroughs while enhancing safety, boosting compliance, increasing productivity, and reducing environmental impact. We do this by delivering products and services that connect the physical and digital worlds. Core technologies in positioning, modeling, connectivity, and data analytics enable customers to improve productivity, quality, safety and sustainability. Trimble software, hardware and services are transforming industries such as agriculture, construction, and transportation and logistics.

For over 40 years, Trimble has created unique solutions that help customers increase productivity and profitability and grow their business. Trimble solutions are used in over 150 countries around the world. Employees located in more than 40 countries, coupled with a highly capable network of dealers and distribution partners, serve and support our customers.

Trimble is also a founding member of the GPS Innovation Alliance, a Washington, DC-based organization dedicated to protecting, promoting, and enhancing the use of the Global Positioning System (GPS), a critical public resource used by nearly every segment of the U.S economy, including smart construction.

About Trimble Construction:

The civil engineering and construction industry builds and maintains the world's road, rail, port, airport, pipeline, power and other critical infrastructure. So much of this work is performed by small businesses - the project owners, contractors and engineers who conceive the projects, invest in the design, move the dirt, construct the road or rail, manage the jobs, and pour the cement.

Our founder, Charlie Trimble, would always tell us to listen to the problems that our customers are trying to solve. Because that is where innovation will come from. When Steve Berglund became our CEO, he advanced that philosophy to knowing the industry. By knowing an industry, you can improve productivity, quality and safety across that industry. That means that the Trimble team that is helping to develop and advance solutions for construction is out in the field alongside the small business owners who are building our bridges and paving our roads. Our hands are dirty, and our shoes are often muddy because we are out on the job site. That's what it takes to understand the construction industry and deliver technology solutions for the small businesses who are building our nation's infrastructure, and to make their work less costly, more productive, more efficient, and more safe.

Technology integration has the potential to transform how the construction industry works through sophisticated planning and design, advanced automation solutions, precision machine control, site positioning, mobile technologies and real time connectivity. These solutions offer project owners increased visibility and traceability at every phase of a construction project so they can stay on track for success. Advanced technology solutions enable all stakeholders to optimize the design, construction and operation of federally funded projects and easily collaborate to ensure that projects are delivered on time and on budget. Accelerating technology deployment would deliver savings to the US taxpayer, and free up resources for the many pressing infrastructure needs of our country.

Infrastructure: What is the problem that Trimble is trying to solve?

The construction industry is ripe for innovation. With $10 trillion in annual revenues – approximately 6 percent of GDP - construction has historically used scale to do its work: bigger machines, more machines, more cement, more nails, more tools and more people. This approach has left the construction industry with plenty of room to improve. At least 10 to 15 percent of that $10 trillion is waste:

- 15 percent of all materials are wasted
- 6-9 percent of total project costs are rework
- 50 percent of all labor costs create no value
- 50 to 70 percent of workers' time is wasted
- 90 percent of projects are late

A recent McKinsey & Co. article claims that large projects across three major asset classes (mining, infrastructure, and oil & gas) typically take 20 percent longer to finish and are up to 80 percent over budget (Imagining Construction's Digital Future – McKinsey & Company, June 2016).

The "scale" approach also creates a major disadvantage for small businesses that don't have the volume to be able to absorb these inefficiencies.

Trimble's Solution: Using Technology to Increase Efficiencies, Reduce Costs, and Improve Productivity

Technology is transforming how we construct roads, bridges, and airports through the optimization of the entire construction lifecycle: planning, design, construction and operation. Trimble's experience in the construction industry has taught us that ineffective communication, planning and collaboration are causing the most problems and driving project costs. This is why the use of digital construction technologies is so important to small businesses because it enables small businesses to better manage their costs, schedules and resources. Examples of Digital Construction technologies include:

Application Software and Modeling. Trimble solutions allow contractors to better manage their processes, resources and assets, wirelessly transfer data in real-time, create 3D constructible models, and prepare and manage design data for intelligent, on-machine use. Contractors can synchronize data and remotely monitor site progress from the office, and create design models that reach machine operators and crew in real time. These solutions allow for transparency, information sharing, and improved communication and decision-making, resulting in on-schedule and on-time project delivery.

Machine Control. Trimble machine and paving control solutions provide machine operators with in-cab, real-time positioning for guidance and control of the machine, allowing them to accurately grade, compact and pave to specifications. Trimble Grade Control Systems help contractors to finish faster with less rework, less staking, less checking, reduced costs and fuel use, less downtime, less re-work and improved material yields. Trimble Paving Control Systems allow contractors to build a smoother surface, reduce material usage and significantly improve productivity and quality.

Site Positioning. Site Positioning Systems allow customers to measure, stake, check, manage and inspect all phases of their earthworks and pacing operations. Contractors can share information, track results instantly, make smarter decisions and manage multiple job sites with ease.

Project Delivery Systems. The gains from investing in technology can be wasted, however, unless they are part of an integrated project delivery system. When a project delivery system is utilized, construction processes are linked, and information generated at one stage becomes the foundation for the next stage of the process, eliminating the waste and inefficiency created by information loss during the hand-offs between the different stages and parties involved.

The return on investment of implementing digital construction technologies is well documented. When technology is used on infrastructure projects, the results are significant and measurable:

- Machine productivity increases 30 percent
- Rework is reduced by 50 percent
- Overall project delivery costs improve by up to 30 percent

Technology doesn't just increase the financial bottom line - increased productivity and efficiency also improve environmental sustainability by reducing the use of fuel and the loss of resources to waste. Reduced rework means less material is discarded. Increased efficiency means that machines run only when they are needed and less fuel is required to run them. Enhanced project delivery reduces the fuel lost to traffic congestion.

Use of alignment planning software can also assist states and localities in optimizing environmental sustainability during the planning of road and rail projects. The Trimble Alignment Planning System enables officials to simultaneously consider environment, community, engineering and cost issues within a single analysis. For example, Trimble was commissioned to assist in the planning of the 16 mile Southern California Foothill Transportation Corridor-South project with significant results. The system saved an estimated 6 to 12 months of planning time and identified alternatives far superior to the options identified using traditional systems. The improvement over the original options reduced the wetland impact by 58 acres; reduced the impact to sensitive species; reduced landslide risk; reduced residential displacement; and minimized the impact on existing utilities (resulting in few utility relocations to undisturbed areas).

Trimble's Commitment to Small Business

Trimble technology is changing how construction work is performed, allowing contractors of all sizes and with mixed equipment fleets, to bid with more confidence, reduce rework, eliminate downtime, improve quality and manage costs. Small business are the life blood of the construction industry, and

technology is allowing small businesses to reduce costs and inefficiency so that they can compete against the larger players in the industry.

At Trimble, we recognize that the decision to implement Digital Construction technologies can be a significant investment for a small business. That is why we try to make the experience as simple, as efficient, and as cost effective as possible. Through our dealer and partner network, our skilled professionals are ready to provide local support and service to our small businesses. Our equipment is rugged, dependable, and easy to use. We work hard to provide personalized training, local service solutions, and comprehensive technical support to ensure that small businesses get the training and support that they need. We also recognize that productivity is absolutely critical – time is money, and small businesses cannot afford to have costly downtime with their machinery. Our dealers and partner network are responsive and help small businesses ensure that they have the tools and support they need to keep their machinery up and running.

I'd like to highlight just a few examples of small businesses that are achieving success using Trimble technology:

> ***Shaw Brothers of Gorham, Maine*** is a heavy earthwork/heavy civil construction firm that does a lot of work for the Maine Department of Transportation. Using machine control to deploy GPS dozers, excavators, and graders has improved their efficiency, precision and accuracy which has generated time savings and cost savings. The State of Maine will sometimes request to review their 3D files for larger jobs, knowing that this data is loaded directly into the machines to deliver the product.
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> ***Silver Spur Construction of Haskell, Oklahoma*** improved their accuracy and grading productivity by 20 percent using 3D grade control. These improvements enabled the company to branch into commercial site work which often involves more complex designs and elevation changes.
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> ***Ajax Paving in Detroit, Michigan*** was able to go completely "stringless" and deliver one millimeter accuracy for paving. In one situation, the team was able to keep a machine moving through dense fog while paving a highway project in Northern Michigan, preventing a shut down that would have wasted 200 feet of concrete that had already been dumped in front of the paver.

In addition to the technologies that allow contractors to increase their efficiency in the field, Trimble's software solutions are enabling small businesses to streamline the entire construction process by better managing variables at the site and in the office. These solutions integrate operations across the office, team and field to manage risk and more effectively collaborate across the broad construction ecosystem. To develop this software, Trimble needed to develop an understanding of the construction continuum, the people and resources needed for each task, and insight into how best to collaborate and/or coordinate the process and people through the use of technology. Trimble's Viewpoint software integrates a contractor's financial and resource management to their project operations and to their jobsite and field. The integration across the office, team and field enables contractors to effectively manage and have visibility to data and workflows that span the construction lifecycle from pre-production planning, to product operations and supply chain management, and then to project hand over and asset operation and maintenance.

Haldeman-Homme, Inc. (HHI), a contractor based in Minneapolis, Minnesota, is a great example of a contractor that recognized that their existing business management tools were creating a bottleneck within the organization and threatening the company's growth. The company's data existed in silos, and the HHI team was using spreadsheets to work around their system, and battling the inefficiency of duplicate data entry and slow processes. HHI transitioned their systems to Trimble's Viewpoint. All of the company's contracts and job costing information are now easily accessible, and the software shares data between accounting, estimating, project management, sales and other departments—removing departmental silos and creating a one-stop construction management solution for the company to work from. The system has allowed the company to grow without increasing administrative overhead.

The Challenge: Lack of Incentives for States to Adopt Technology

Our fifty state Departments of Transportation have a high level of awareness of the benefits of digital construction techniques and management systems. However, investments in such capabilities compete for scarce resources with much needed infrastructure projects in each state, which has in many cases limited the pace and scope of adoption of the systems and capabilities which would support enhanced management and oversight of the projects themselves.

Much work remains to be done to fully realize the benefits of these technologies not only for small businesses in the construction industry, but also for the American taxpayer. Resources provided by the federal government would accelerate the advancement of these project delivery efficiency tools, speeding up and reducing costs across the spectrum. Congress has a once-in-a-generation opportunity to transform the federal investment in infrastructure by incentivizing states to adopt modern, commercially-proven, and competitively acquired digital construction management systems and processes for infrastructure projects.

Trimble supports the creation of additional incentives for states to upgrade the technical skills of the engineers and technicians who we count on to maximize value in project delivery. This will result in faster, less costly and overall more efficient project development, delivery and construction in communities across America resulting in safer roads, better lifecycle costs and less disruptions to commerce.

We recommend for your consideration a program included in the Senate Environment and Public Works Highway reauthorization proposal. Section 3005 of S. 2302, America's Transportation Infrastructure Act of 2019, provides funding for states and localities to adopt and implement digital construction management systems that will support more effective management of the bidding, design and execution of infrastructure projects. This will significantly decrease the costs of projects and improve the timeliness of project delivery, freeing up resources for other priority infrastructure needs.

Small businesses, including Cold Spring Construction in New York, Shaw Brothers in Maine, Ajax Paving in Michigan and Haldeman-Homme of Minneapolis, Minnesota will also benefit from enactment of this provision of S. 2302. This provision will support State adoption of efficient processes and management of 3D design models throughout the construction life cycle, and it will also reduce bureaucratic barriers that prevent full realization of the efficiencies that 3D design models and other digital construction technologies provide. It will also ensure that the officials who manage competitive bidding opportunities fully appreciate the benefit of small business investment in these technologies.

Finally, Trimble also supports H.Res. 219, a bipartisan resolution affirming the importance of continuous availability, accuracy, reliability, and resiliency of the GPS constellation. High-precision GPS is one of the most critical tools for enhancing the efficiency of the construction process.

Conclusion:

Trimble is working to deliver innovative technologies and software applications that transform the construction workflow. Understanding our customers' needs and workflows helps us to provide better solutions. We are focused on giving owners increased visibility and traceability - from engineering to construction - so they stay on track for success. And we are providing every contractor with the confidence to get the job done right, on time and under budget, with a holistic continuum of solutions for every phase of the project. We are proud that our advanced technology solutions are enabling small businesses to operate more efficiently, to optimize the design process and easily collaborate with all stakeholders, and to deliver high quality construction projects built with confidence.