

Congress of the United States
U.S. House of Representatives
Committee on Small Business
2361 Rayburn House Office Building
Washington, DC 20515-6515

MEMORANDUM

TO: Members, Small Business Subcommittee on Contracting and Infrastructure
FROM: Chairman Jared Golden
DATE: November 19, 2019
RE: Subcommittee on Contracting and Infrastructure hearing entitled, “Smart Construction: Increasing Opportunities for Small Businesses in Infrastructure” on Tuesday, November 19, 2019, at 10:00 a.m. in Room 2360 of the Rayburn House Office Building

The Committee on Small Business will meet for a hearing titled, “Smart Construction: Increasing Opportunities for Small Businesses in Infrastructure” The hearing is scheduled to begin at 10:00 A.M. on Tuesday, November 19, 2019 in Room 2360 of the Rayburn House Office Building. Advanced construction technology like GPS enabled equipment, 3D digital design software such as Building Information Modeling, and proptech enable construction companies, civil engineers, and developers to build infrastructure that is safer, energy efficient, and sustainable at a lower cost. This hearing will explore new developments in smart construction technology and opportunities for small businesses to play a major role in improving America’s infrastructure.

Witnesses include:

- Mr. Lennart Andersson, RA, Director of Virtual Design, Construction & Operations (VDCO)/Professor, LiRo Group/Pratt Institute, Irvington, NY
- Mr. Ryan Forrestel, President, Cold Springs Construction, Akron, NY
- Mr. Chris Shephard, Vice President, Construction Solutions Group, Trimble, Inc., Dayton, OH
- Mr. Phillip Ogilby, CEO and Co-Founder, STACK Construction Technologies, Cincinnati, OH

Background

Advanced digital construction methods produce dramatic savings and create opportunities for small businesses. By leveraging data and digital models, construction sites have become safer and more efficient. However, like many industries, construction and design management are only beginning to utilize internet of things (IoT), artificial intelligence (AI) and cloud technologies to build at a lower cost and in a timelier manner. In the last three years, data indicates that only 31% of construction projects are completed within 10% of their original budget.¹ Additionally,

¹ *Climbing the Curve: 2015 Global Construction Project Owner’s Survey*, KPMG, (2015), <https://home.kpmg/content/dam/kpmg/pdf/2015/04/global-construction-survey-2015.pdf>.

only a quarter were completed within 10% of their original deadline.² According to a survey 69% of owners say poor contractor performance is to blame for exceeding cost and time for construction projects.³ These failures create an opportunity for nimble digitally empowered small businesses to meet project needs. Because the cost and time savings are so great, small businesses who retrofit their equipment with digital tools are often able to recoup their investment.⁴ This also levels the playing field because as small contractors adopt tools, they can scale and take on more difficult projects.

Two broad categories of digital innovations are particularly important to the construction industry.⁵ They include advanced project management tools and digital 3D models. These automated and connected machinery enable small contractors to develop their projects more efficiently. In fact, comprehensive use of digital construction technologies and systems would reduce costs in engineering and construction of projects by 13 to 21%, and by 10 to 17% in the operations phase.⁶ This can reduce the cost of updating U.S. infrastructure by the billions. The hearing will give Members the opportunity to learn more about the technology available to small firms and the impact its utilization has on construction businesses.

Digital Construction Equipment and Advanced Modeling

Digital management of projects enables the use of advanced technology on the construction site to better execute construction projects.⁷ Because construction workflows are highly repetitive, there is huge potential in leveraging state-of-the-art automated and connected machinery, such as excavators, bulldozers, and compactors, linked to a 3D model, a fleet-management system, and optimized routing software to perform tasks faster, safer, more accurately, and with minimal supervision. Placing the design on the machine and having it automatically control the machine's activities streamlines the construction process by reducing the need for corrective changes and costly rework on-site.

² *Id.*

³ *Id.*

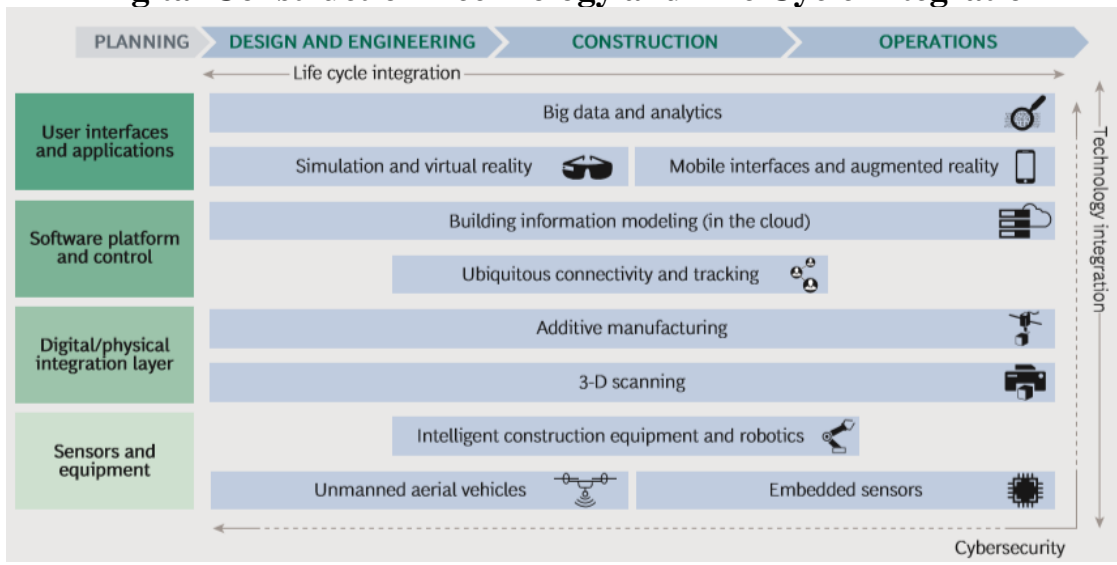
⁴ Sarah Lorek, *BIM ROI: Small Firms Can Save Money Too*, Constructible, May 3, 2018, <https://constructible.trimble.com/general-contractor/bim-roi-small-firms-can-save-money-too> (last visited Nov. 18, 2019).

⁵ Phillip Gerbert, *et al.*, *The Transformative Power of Building Information Modeling*, BCG, March 8, 2016, <https://www.bcg.com/publications/2016/engineered-products-infrastructure-digital-transformative-power-building-information-modeling.aspx> (last visited Nov. 18, 2019).

⁶ *Id.*

⁷ *Id.*

Digital Construction Technology and Life Cycle Integration



Source: BCG Analysis

Advanced project management techniques and digital 3D models (often referred to as Building Information Modeling or BIM) improves the efficiency of construction projects from design through construction and operation. Using detailed “constructible models” throughout construction not only provides a blueprint for a project, but allows measurements to be taken in the field during all phases of construction that ensure the project is being built exactly as specified in the model.⁸ The constructible model allows funding agencies and contractors to anticipate and identify problems early by building the project digitally and then building it physically, significantly reducing change orders and rework costs. The same models flow through following project completion, reducing the costs of operation and maintenance of an infrastructure asset.

Small Business Opportunities

There are more than 3 million small construction businesses in the U.S.⁹ They employ over 82% of U.S. employees in the construction sector.¹⁰ However, only 36.4% of construction businesses survive more than 5 years.¹¹ One of the top reasons small construction companies fail is proper project planning and accurate estimation of construction costs.¹² However, digital tools can provide small construction firms with resources to better estimate and carry out construction projects. In fact, digital technology like advanced modeling and automated machines can reduce construction costs by 10 to 15% and 14 to 23% in the operations phase.¹³ Small businesses with limited margins need these savings to compete for larger and more complex projects. Large

⁸ *Id.*

⁹ U.S. SMALL BUS. ADMIN., 2018 Small Business Profile, (2018), <https://www.sba.gov/sites/default/files/advocacy/2018-Small-Business-Profiles-US.pdf>.

¹⁰ *Id.*

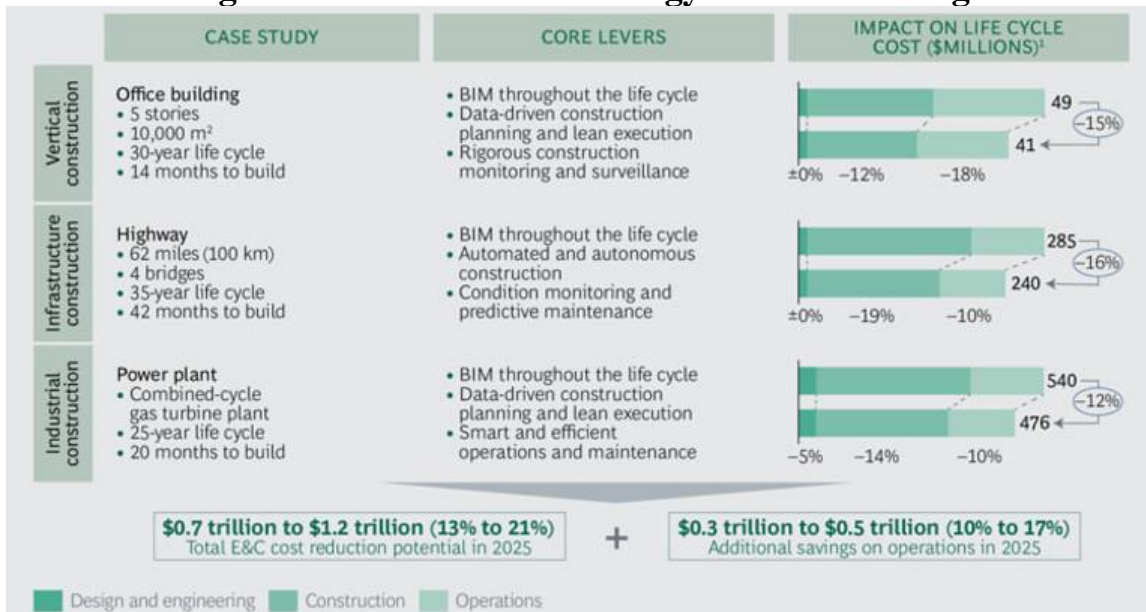
¹¹ Aleks Merkovich, *21 Insightful Construction & Construction Industry Statistics*, FitSmallBusiness.com, April 9, 2019, <https://fitsmallbusiness.com/construction-statistics/>.

¹² Small Business Growth Partners, *7 Reasons Construction Companies Fail and What to do About it*, <https://smallbusinessgrowthpartners.com/7-reasons-construction-companies-fail-and-what-to-do-about-it/>.

¹³ Gerbert, *supra* note 5.

projects like hospital have even great cost savings opportunities averaging 15 – 25% in savings.¹⁴ Similarly, infrastructure projects also average approximately 25% in cost savings. These margins present an opportunity for nimble small businesses to be included on larger and more complex projects by leveraging technology to increase the productivity and ability to estimate and present lower bids.

Digital Construction Technology and Cost Savings



Source: BCG analysis

Government Programs Advancing Digital Construction

Though the benefits of integrating digital construction solutions into infrastructure projects is apparent, there has been limited state and federal funding to advance the use of this technology. The Department of Transportation’s (DOT) Transportation Infrastructure Finance and Innovation Act (TIFIA) program provides loans and lines of credit for digital equipment and states like Florida, New York, and Arizona have had success at the state level. Federal legislation such as the Fixing America’s Surface Transportation (FAST) Act has authorized funding to advance digitally-enabled construction projects but there is still more funding and policies needed to ensure that incentives for integrating digital tools are included in the U.S. comprehensive infrastructure funding package.

TIFIA Program

The TIFIA program helps finance surface transportation projects through direct loans, loan guarantees, and lines of credit.¹⁵ TIFIA’s goal is “to leverage limited Federal resources and stimulate capital market investment in transportation infrastructure by providing credit assistance in the form of direct loans, loan guarantees, and standby lines of credit (rather than grants) to

¹⁴ *Id.*

¹⁵ TIFIA CREDIT PROGRAM OVERVIEW, <https://www.transportation.gov/tifia/tifia-credit-program-overview> (last visited Nov. 18, 2019).

projects of national or regional significance.”¹⁶ The TIFIA program has received significant funding. This year, the TIFIA program has financed over 1.5 billion in construction projects.¹⁷ Within TIFIA there is also a Rural Project Initiative that is aimed at advancing critical infrastructure projects in rural communities.¹⁸ Through the initiative offers TIFIA loans for project in rural communities that are between \$10 million and \$75 million in cost at fixed rates that are well below the market interest rate.¹⁹

State Programs

State DOTs are aware 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. Despite these constraints, state DOTs have impressive accomplishments in deploying digital construction systems and technologies, such as Alaska, Arizona, Florida, New York and Utah.

FAST Act

In 2015, President Obama signed The Fixing America’s Surface Transportation (FAST) Act into law. The FAST Act included sections which authorized approximately \$67 million a year over five years for the Technology and Innovation Deployment Program (TIDP) and additional funding and flexibility into the TIFIA program. Using these funds, the Federal Highway Administration established a very successful Accelerated Innovation Deployment Demonstration program funded at \$10 million per year to provide States, Federal Land Management Agencies, and Tribes with grants for technology deployment into all facets of surface transportation projects. Given the limited size of these programs, funds were awarded on a rolling first come, first serve basis, meaning that not all states were able to benefit from the program.

Conclusion

Digital construction solutions are increasing efficiency and creating opportunities for small businesses. By leveraging connected equipment and digital models, construction is becoming safer, more energy efficient, and projects are finished in a timelier manner. Because the benefits of this technology can be retrofitted to existing equipment provide immediate improvements, small businesses are able to acquire and integrate these tools and compete for larger projects. The federal government has enacted legislation and provided funding to advance the adoption of digital tools, but more must be done to ensure that incentives to adopt digital construction solutions are implemented to make the best use of federal infrastructure funding.

¹⁶ *Id.*

¹⁷ TIFIA PROJECTS FINANCED, <https://www.transportation.gov/tifia/projects-financed> (last visited Nov. 18, 2019).

¹⁸ TIFIA RURAL PROJECT INITIATIVE, <https://www.transportation.gov/buildamerica/programs-services/tifia/tifia-rural-project-initiative-rpi> (last visited Nov. 18, 2019).

¹⁹ *Id.*