PlanGrid

How to Successfully Leverage BIM in the Field

Industry Best Practices for Field Teams Using BIM Today

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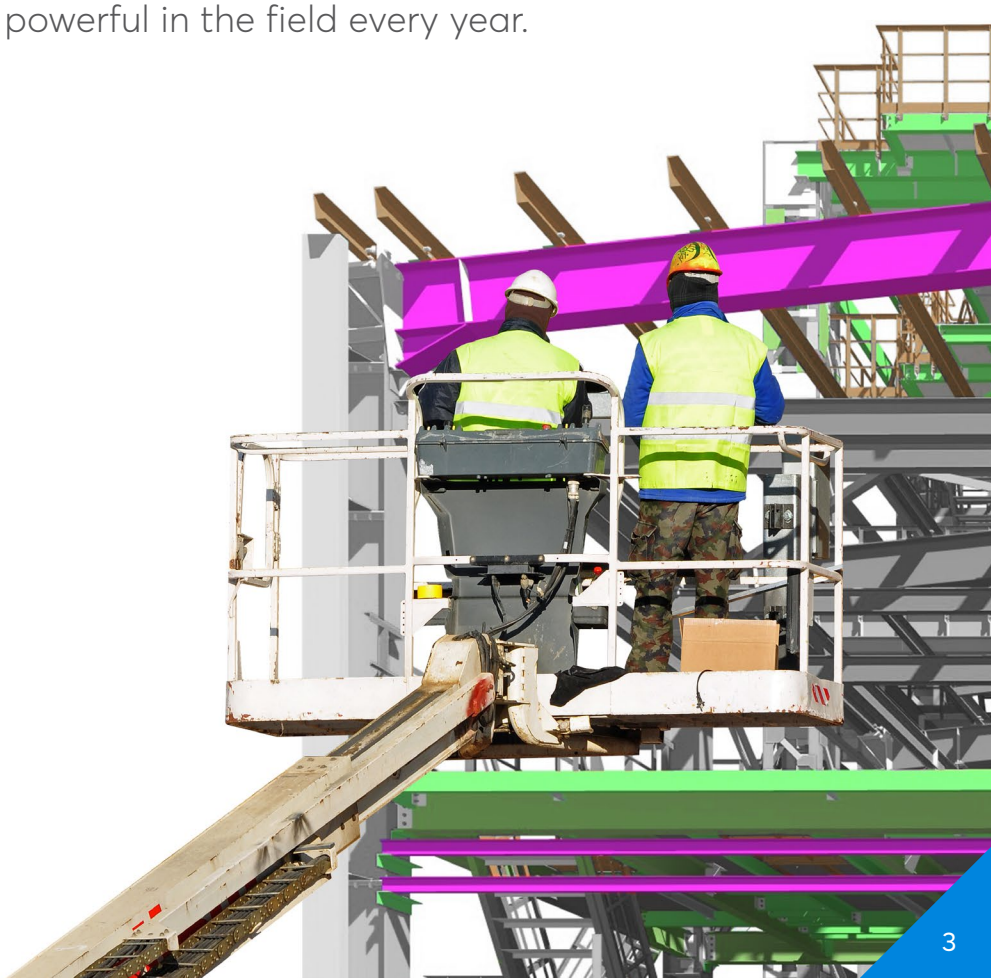
Introduction

Building information modeling (BIM) has recently transitioned from a tool used only by architects and designers into a viable solution for construction firms as well. This advanced form of modeling takes traditional blueprints, plans and drawings to a new level with the power of 3D modeling. Combine that modeling with engineering and organizational tools and it's no wonder that over 60 percent of surveyed companies credited BIM use with a high level of project error reduction.[1] BIM can even be put to use after construction is done for facility management tasks like calculating the energy use and efficiency of a particular structure. Mobile devices and integrations with other construction technology apps are making BIM tools even easier to implement and more powerful in the field every year.



Understanding BIM

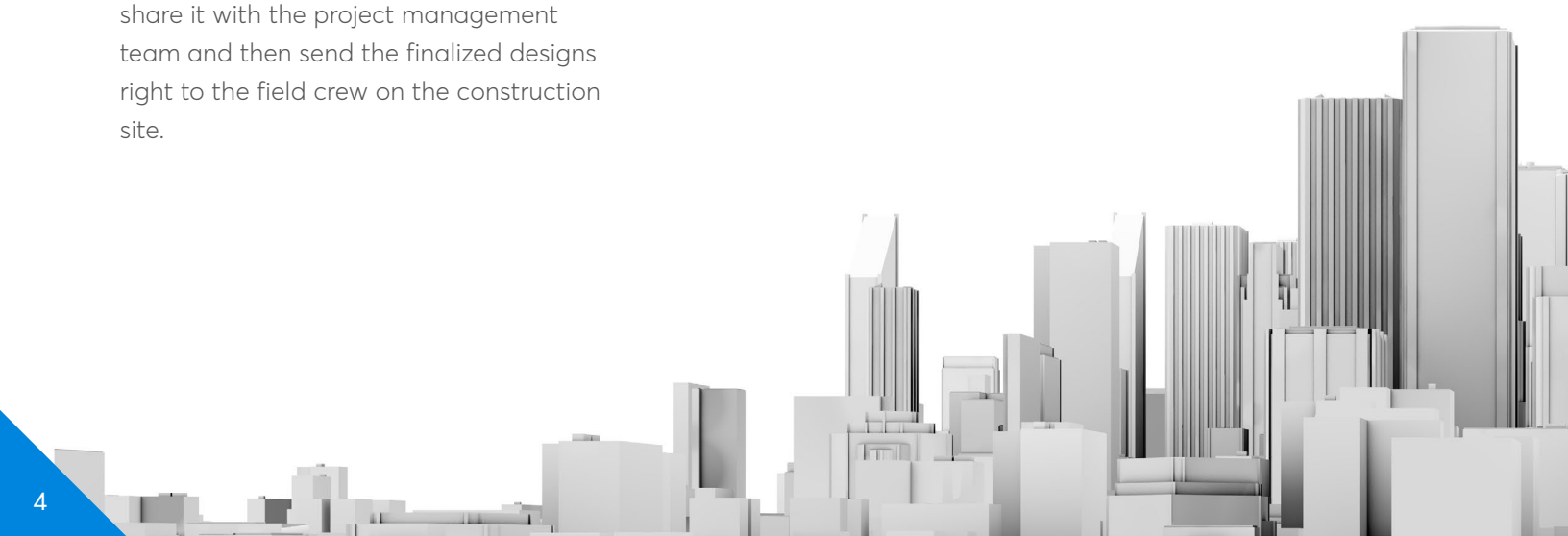
BIM is built around a core of 3D modeling and interactive engineering tools, but the system goes far beyond those services. Modeling and engineering files are most useful when they're easily shared with individual contractors working from the designs, so modern BIM approaches are built around this idea.

Comprehensive Approach for the Entire Design Team

Today's BIM systems, such as BIM360, serve as total file management and data-sharing systems to seamlessly connect architects, designers, project managers, construction workers and subcontractors. When accurate 3D modeling first emerged in the construction industry, these services quickly became siloed.[2] While engineers are the primary beneficiaries of BIM, the highly accurate plans they create with these tools are most useful in the hands of the construction crew. This naturally led to an expansion of BIM services to include collaboration and seamless file sharing. Now designers can collaborate with each other, work directly on the same model, share it with the project management team and then send the finalized designs right to the field crew on the construction site.

3D Modeling Power

Surveying and 2D drawings are more useful when used in conjunction with 3D modeling processes. Computer-assisted drawing (CAD) was the first tool available for making realistic building models, but BIM technologies build on that modeling platform by using and storing far more information.[3] Everything from material lists to energy efficiency ratings is adjusted on the fly with each wall, window and other feature added or subtracted from the design. The 3D model doesn't just represent the physical layout of the structure; it also gives the engineers and construction crew important information about the overall building performance and installation of essential parts.



Global Government Initiatives

Many countries are adopting BIM initiatives to require use of these planning systems for public and government contracts. The UK has adopted some of the strictest BIM requirements, with decisions made in 2011 to require the use of BIM software on all public sector projects by 2016.[4] Early implementations from 2009 to 2015 saved 20 percent of construction costs, proving BIM's value.[5]

The U.S. has had a BIM and 3D modeling initiative from the General Services Administration since 2003, but as of 2019 there's still no definite national mandate requiring adoption for public contracts.[6] Sweden, Finland and Norway were some of the first countries to require BIM for government construction contracts and even some home builders associations mandate the use of the software for members. Russia, Denmark and many other European and Asian countries like Hong Kong and Singapore have all announced plans to consider their own BIM requirements in coming years.

Planning to Completion

BIM services also vary from other tracking and planning software options by covering the entire design, bid and build process from beginning to end. Every piece of information can flow easily from the BIM software to other apps, as long as native integration is available to assist in the transfer of files. There's no need to manually convert files or copy over information when using apps that work seamlessly together, such as Revit® and PlanGrid. Even when wrapping up a major construction project and handing over designs to the new owners or managers of the building, BIM simplifies the process and produces the most accurate documentation.

Benefiting from BIM

With proper training and adoption across the entire company, any construction firm can benefit from BIM. The specific benefits vary, depending on the services the company offers and its workflow.

Better Risk Analysis

One of the biggest benefits of BIM begins in pre-planning, even before the earliest designs are produced. The sheer volume of information available through this kind of system allows a construction firm to analyze the risks of a particular project more accurately than ever. Predicting the risk of material cost changes, site problems, permitting issues or other obstacles allows a company to decide if they can turn a fair profit on any particular contract. The structural analysis provided through the use of these tools can help predict the potential of missed deadlines or budget overruns due to changes in material costs or availability of skilled labor.[7] Without proper risk analysis, construction companies run the risk of going over budget and losing money.

More Accurate Estimates

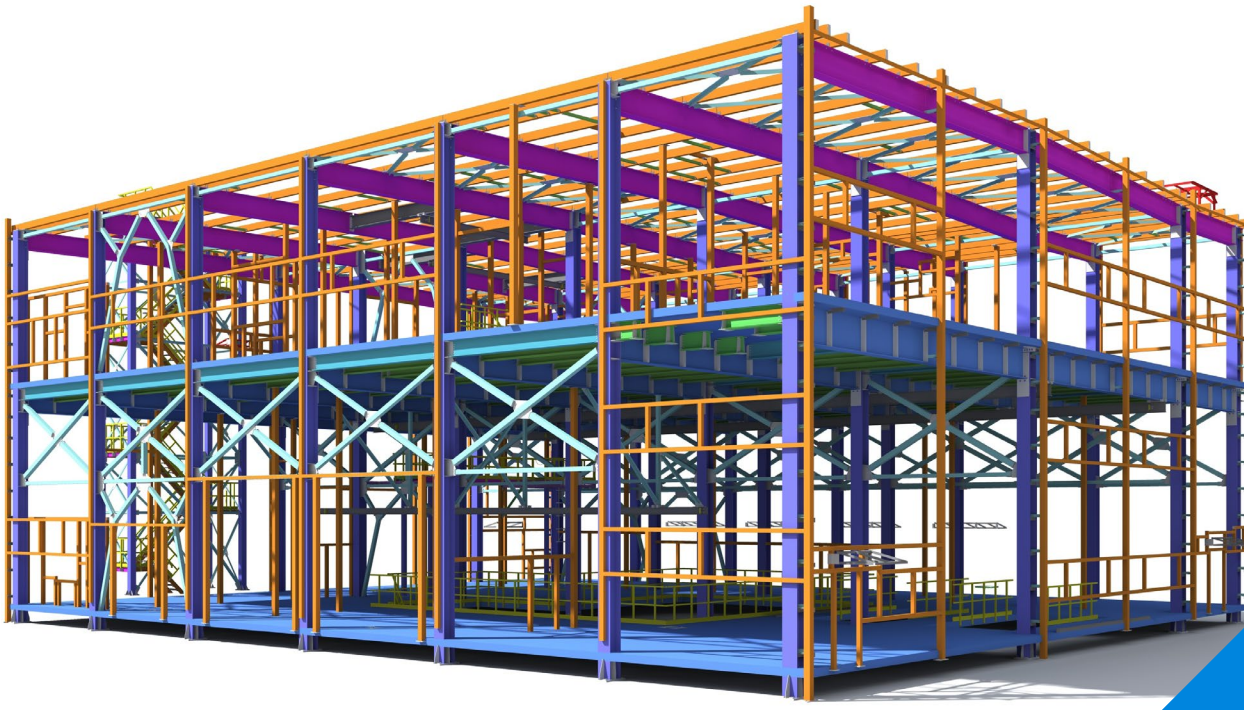
Another huge benefit of using BIM comes during the estimation stage. Construction firms that bid on projects rather than just accepting pre-budgeted offers must create accurate estimates to keep their customers happy and profit margins healthy. Small mistakes in estimation add up to serious losses, especially if a budget overrun means a firm loses a major client. BIM is the best tool for creating accurate and fully detailed estimates that clearly communicate the need for each cost to the client.[8] It's important to note that this benefit has been already proven in countries where Level 2 usage is mandated.

Fewer Project Delays

Every mistake, missed detail or delay on a construction project contributes to lost productivity. A study conducted in 2018 by PlanGrid and FMI Corporation found that U.S. construction companies lose over US$177 billion a year to unproductive labor costs.[9] Furthermore, up to 60 percent of budget overruns on major construction projects are due to delays and lost productivity.[10] Reworking tasks that can be automated or transferred from other departments uses up thousands of hours of useful time. With clashes detected and eradicated during the planning and design stages, costly permit and site changes are avoided altogether.

Clearer Communication

When BIM was reduced to sharing advanced 3D models between architects and engineers, its value was limited by the siloed nature of esoteric file formats and viewing requirements. Now that BIM software is available to every member of the construction team, communication has improved because team members can discuss changes and share their ideas in concrete ways. Engineers and architects can also produce essential drawings to specify the installation practices construction workers will need to follow.



Coordination of Trades

One of the most classical uses of BIM tools is for coordinating the many different trades required for completing a structure. Electricians can't move in to complete their work until the framing reaches a certain point, but bringing them in too late creates delays and unnecessary labor as well. Modeling a building and separating out the various trade processes with a coordination matrix makes this process run much smoother.[11] Priorities are listed for each trade, along with the sectors of the construction plan they'll be needed for, to make scheduling much easier. The teams of different tradespeople often need to coordinate separately as well, such as electrical contractors working with the HVAC crew to connect heating and cooling equipment. A coordination matrix is the best way to see where these points of overlap occur.

Applying BIM to Construction Practices

Deciding to adopt a BIM system is only the first step in improving a construction company's productivity and planning procedures. These systems are complex and consist of many integrated parts that work in concert to track and manage the biggest construction projects. A company can choose which parts to apply in the field to fit their particular needs without investing in unnecessary components.

GPS and Drone Mapping

Accurate and fast 3D mapping begins with a point cloud. Even when the design starts at raw graded soil and includes everything from the foundation upward, there's a need to generate a point cloud of the site before design work begins. Ground surveys will work for capturing this information, but it can take weeks to get a complete survey.[12] GPS software providing accurate topographic measurements is the most common option for creating raw site measurements. Drones can provide more accurate measurements when handled by a skilled professional, resulting in less work to adjust the point cloud after it is uploaded to the BIM system.

Laser Scanning

When building in an environment with many clash risks, the inclusion of neighboring structures and utility lines that limit the finished design is essential. Laser scanning is the fastest way to capture existing structural information and import it directly into any BIM software. Unfortunately, laser scanning is also much more expensive than drone and traditional survey services. However, the point clouds generated with this method are as accurate and finely detailed as possible, so they're well worth the cost. Few construction firms have enough demand to purchase laser scanning equipment and pay a full-time dedicated employee to manage it, so this service is primarily handled by qualified subcontractors instead.

Mobile Device Apps

Due to the intense processing requirements of 3D modeling software, BIM solutions were once largely limited to desktop platforms that could supply enough power. Now with the ready availability of smartphones, tablets and other relatively powerful mobile devices, BIM can truly go mobile and work just as well in the field as in the office. Of course, a construction company will need a mobile management policy before asking its employees to start signing into mandatory mobile apps.

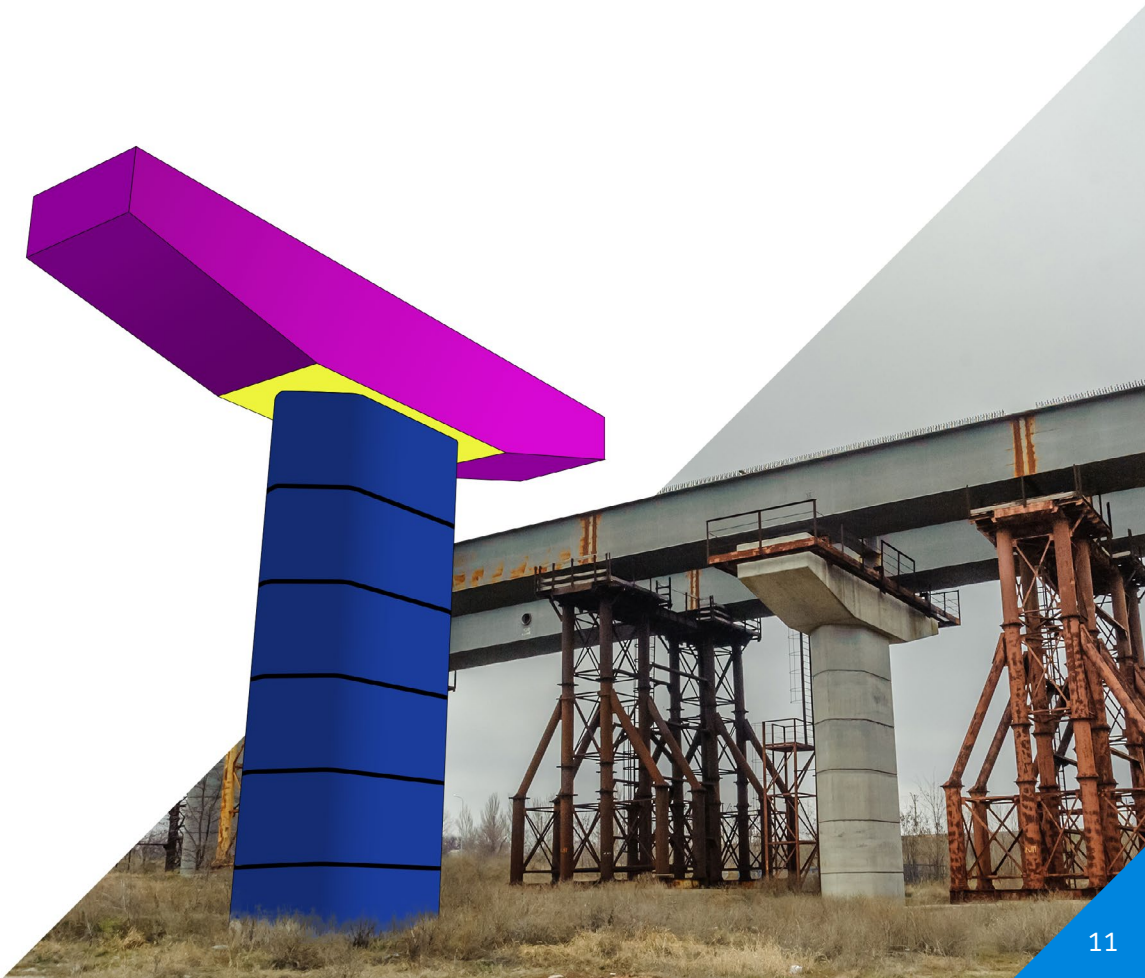
In addition to choosing a BIM system with mobile app access, construction companies need to look for extensive integration opportunities. Apps shouldn't just communicate internally; they should also communicate externally. For example, PlanGrid offers native integration options with AutoDesk® Revit. This allows for on-the-fly change management from a wide range of both mobile and desktop platforms, connecting field and office teams in collaboration on Revit 3D models and related PlanGrid data sheets.[13]

Handover Packages

The end of the construction process and closeout of the contract is when BIM really shines. Creating the handover packages that detail the construction methods used for finished structure plans can take weeks, delaying occupation of the structure if these packages are required for final inspections. Since BIM software produces plenty of drawings and models along the way, organizing the materials into a package and transferring them to the owner of the property is much easier than with traditional methods. Construction firms can create handover packages with all the last-minute changes reflected in the materials they present to their clients.

Conclusion

Most construction companies are still just scratching the surface of the potential of BIM. With the global market for BIM services projected to reach US$12 billion by the end of 2022, it's clear that demand will continue to grow.[14] Construction companies that embrace BIM now and invest in training for all employees will be ready to meet any mandates set by government or business partners. Waiting a few more years to settle on a BIM decision will only cost a company money in lost contracts and reduced productivity.



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PlanGrid's Construction Productivity Software is the easiest and most cost-effective way to get substantial return on your investment in construction mobile apps. By using PlanGrid you will:

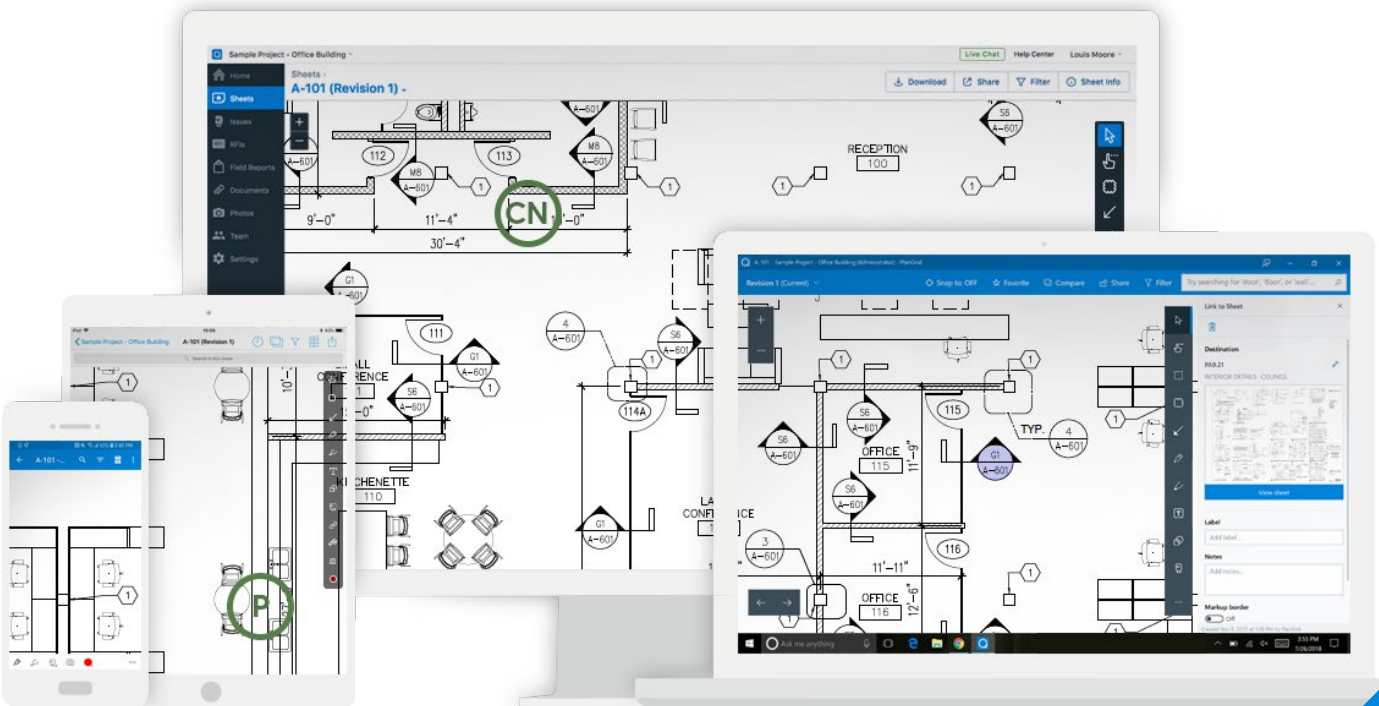
- **Complete projects faster:** 90% of project costs occur in the field and not in the office. This includes wasted time and project delays. With PlanGrid, you can reduce wasteful trips to the trailer and time delays, while eliminating costly rework. PlanGrid also allows for faster collaboration and communication.
- **Reduce costs:** PlanGrid allows you to optimize productivity in the field, which eliminates time waste that causes project overruns. By completing projects early or on time with PlanGrid, contractors will benefit from reduced costs.
- **Win more bids:** The best way to bid more competitively is not just to track costs so you can provide more accurate estimates — it's to improve your overall productivity. PlanGrid's Construction Productivity Software will allow you to increase productivity so you can reduce costs and win more bids.

PlanGrid is construction productivity software used on more than 1 million projects across 90 countries. Our software helps teams collaborate more efficiently with access to an intelligent record set on any device.

Available on the App Store
★★★★★ (3,904)

Get it on Google Play
★★★★½ (2,080)

Available on Windows



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Used on more than 1,500,000 projects around the world, PlanGrid is the first construction productivity software that allows contractors and owners in commercial, heavy civil, and other industries to collaborate, collect, and share project information from any desktop or mobile device through the entire project lifecycle.

PlanGrid increases project efficiency by streamlining document management, providing construction teams with easy access to all project information from any device, and enabling seamless collaboration within teams.

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