THE GENERAL CONTRACTOR'S GUIDE TO THE MODERN CONNECTED JOBSITE

Trimble

As a general contractor (GC), you likely wear your hard hat most days. But, you know better than most that GCs wear a lot of different hats, figuratively speaking at least. After all, you're not just responsible for overseeing the physical building of a project onsite. Your responsibilities often span from conception to post-erection, and the best GCs thrive in that wide scope of authority.

So, with so much of any given construction project under your direct or indirect control, how can you ensure you're approaching each task in the best way?

The answer lies in data.

Specifically, how much information you have available, how and when you're getting it, and how accurate it turns out to be. In today's tech-reliant construction environment, information isn't lacking at any phase of a project. But, without the right tools on hand and a framework for effectively harnessing their output, most of that information is going to pass you by, come to you too late, or get misunderstood. And all of those issues can spell disaster for a modern construction project.
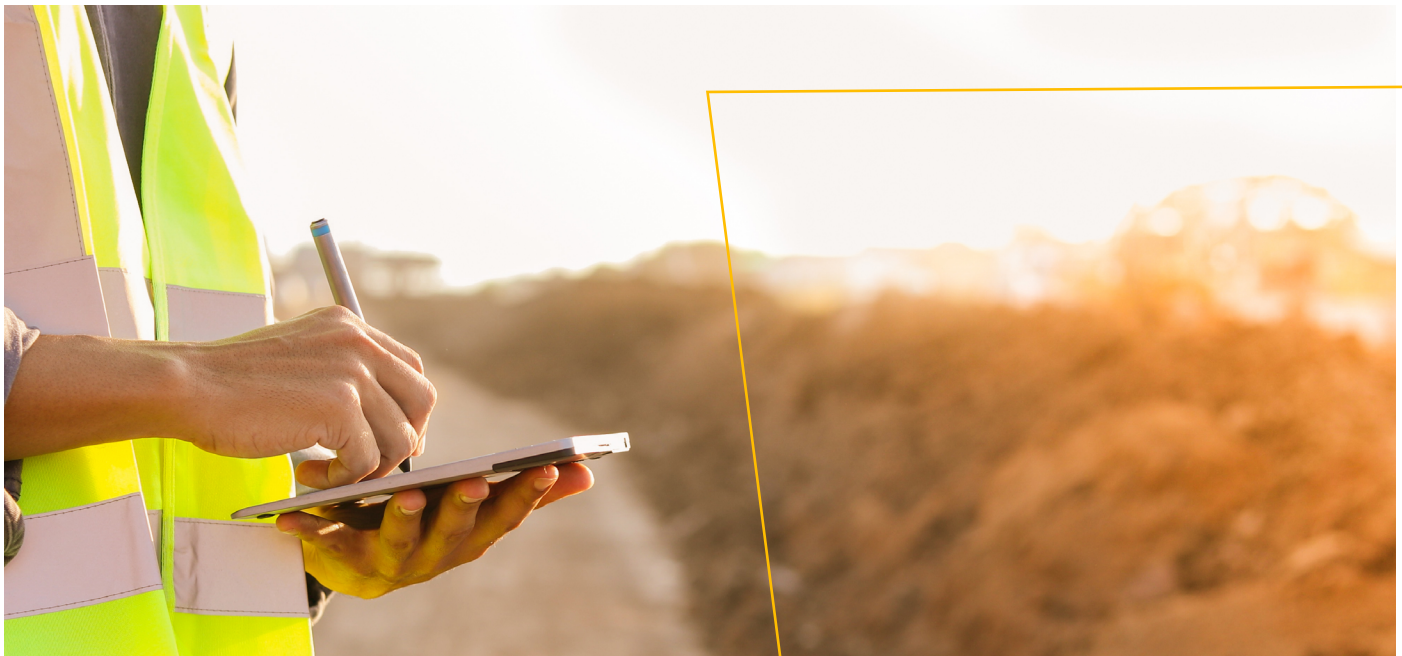
⬡ THE CONSTRUCTIBLE PROCESS

The Constructible Process is a powerful framework developed by Trimble created to harness data throughout all phases of a construction project. That data is then used to enhance speed, efficiency, quality, and profitability. The Constructible Process relies on three foundational pillars:

1. All phases and trades are **Connected**
2. Models and workflows are **Content-Enabled**
3. **Constructible** models drive smarter workflows

The "connected jobsite" is an example of how the Connected pillar can be applied to the construction workflow.

With this in mind, let's take a quick look at responsibilities as a general contractor, as well as the expectations your customer has going into a project. Then, we'll discuss the concept of "the connected jobsite" and go into depth about the tools you should have in your virtual "toolbox" if you want to optimize every project under 21st century conditions.

YOUR RESPONSIBILITIES

As a general contractor, you're responsible (to a greater or lesser extent on each unique project) for providing all of the material, labor, equipment and services necessary to complete the construction of the project. This begins in the **estimating** stage and carries through **takeoff, detailing, fabrication, layout** — and beyond. Usually, this involves hiring specialized subcontractors to perform all or portions of the pre- construction and **building** work. And, when doing so, you are responsible for the quality of all the work they perform.

When the main building process is taking place, the general contractor's number one priority is safety and security on the job site. With construction work counted among the most dangerous jobs in most countries, this is no small task. And, success is not only beneficial to the health and welfare of those working on the project, but it's a vital factor in the project's financial success as well.

In addition, a GC's responsibilities may include applying for building permits, securing the property, providing temporary utilities on site, managing personnel on site, providing site surveying and engineering, disposing or recycling of waste, monitoring schedules and cash flows, and maintaining accurate records.

YOUR CLIENT'S EXPECTATIONS

Going beyond the actual responsibilities that are written into most GC contracts, you need to consider your client's expectations as well.

In many cases, owners who hire a general contractor to head up their project have little or no experience in the realities of large-scale construction. That means they're relying on you for direction.

Managing client expectations and keeping them up-to-date on a project's progress turns out to be a huge part of the job, even if it feels like it shouldn't be. After all, the client is the one paying for everything you're doing, so they have a right to know what's going on at any given time. Some wish to be more involved than others, and some are easier to work with. But, there's no getting around the fact that serving as the client's eyes and ears on the ground — as well as their advisor, and sometimes their source of tough love or brutal honesty — goes with the job.

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Now, keeping both your main responsibilities and your client's expectations in mind, let's take a look at what a connected jobsite is and how it bears on your ability to carry all these out.

WHAT IS "THE CONNECTED JOBSITE"?

The phrase "the connected jobsite" refers to the way numerous forms of modern technology make managing a complex, large-scale construction project easier, more efficient and more effective than ever before.

The basic components of the connected jobsite include:

- ▶ **Cloud-based software**

- ▶ **Mobile devices (primarily phones and tablets)**

- ▶ **WiFi-enabled equipment**

- ▶ **Peripherals**

Let's break these down with practical examples of how they can be used in the field.
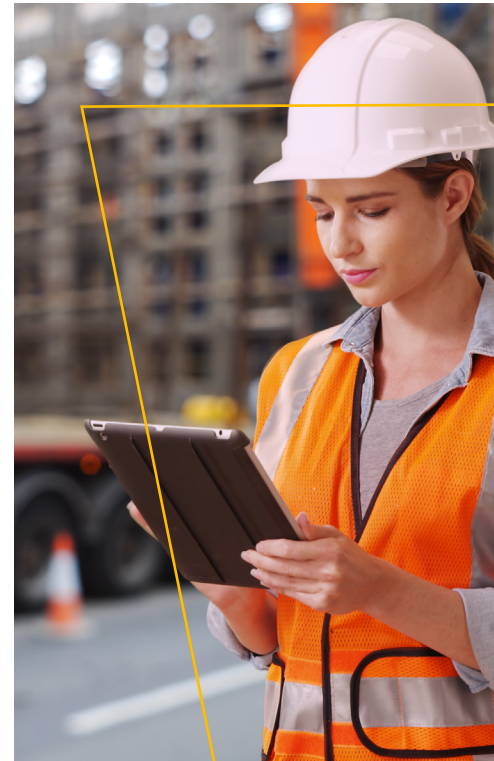
Cloud-based software

Software of one form or another is used at every stage of the construction workflow:

- ▶ **Engineering**
- ▶ **Estimating and job submittals**
- ▶ **Detailing**
- ▶ **Takeoff**
- ▶ **Scanning**
- ▶ **Layout**
- ▶ **Fabrication**

- ▶ **Project management**
- ▶ **Jobsite security**
- ▶ **Personnel management**
- ▶ **Safety management**
- ▶ **Administrative (including billing, scheduling, human resources, legal, and more...)**

Cloud-based software (cont.)

Without the software tools available today, all of these jobs would be much harder, take far longer, and be more prone to human error, all of which impacts profitability and success.

However, achieving a truly connected jobsite requires more than just using adequate software for each of these project silos and getting each job done right. A truly connected jobsite requires that, at the very least, all the applications used to manage aspects of the physical building project itself share the following qualities:

▶ **They play well together:** sharing data freely and efficiently so every piece of data is available to every department, as needed, at any given time.

▶ **They run on the cloud:** so physical location, a wired network, and/or the status of a single laptop or device doesn't dictate whether that precious information can be shared in real time, wherever and whenever it's needed.

▶ **They're platform and device-agnostic:** data should be available and usable, whether your subs or office staff are working on Macs or Windows computers, iPhones or Android phones, iPads or Android tablets, or any other configuration.

Of course, if the software used in some or all the phases can meet these same criteria, that will only make your job (and that of just about everyone else working on the project) that much easier and more effective. That way, any situations that arise on the jobsite that require the input of estimators, detailers, engineers, or fabricators can be handled that much faster and more accurately.

Mobile devices

It's no revelation to realize that everyone walking around your jobsite has at least one mobile device on hand. Some will be carrying several. As noted above, the modern jobsite basically screams out for mobile-friendly software tools that make it possible for construction workers, safety managers, supervisors, and inspectors alike to access the information they need on their mobile phones and tablets as quickly and efficiently as possible.

That doesn't just mean choosing software that's optimized for mobile use. Since most circumstances are BYOD (bring your own device), it also means making sure the software works equally well whether the individual accessing it is carrying an Apple or an Android device. Arranging for strong WiFi signal that effectively covers the area and provides appropriate network security is also vital.

WiFi-enabled equipment

Speaking of WiFi, each individual's personal mobile devices aren't the only tools that need to be considered from a networking and software standpoint. There are also a number of hardware tools that can greatly enhance the work being done on a modern connected jobsite if they're able to connect to the cloud and/or an operator's mobile device via strong WiFi signal.

These include robotic total stations (RTSs) and rapid positioning tools (RPTs) that can greatly speed up the layout and measuring processes, GPS-enabled positioning systems for situations where line-of-sight is difficult to maintain, along with 3D laser scanners for digitally establishing as-built data.

All these powerful tools add the speed and efficiency of automation and single-person operation, which saves both time and money. They also offer exceptional accuracy, which reduces rework and enhances the quality of the finished product.

Peripherals

Finally, along with all the hardware and software we've already discussed, additional peripherals can be used to create a connected jobsite based on unique conditions and circumstances. These can include:

- ► **RFID tags and readers**
- ► **Cameras**
- ► **Access control gates**
- ► **IoT-enabled equipment**

This is a quickly-expanding area that will, no doubt, offer even more exciting and creative options for general contractors of the future looking to establish the most productive and profitable connected jobsite possible. But, even now, these additional tools can be integrated with the software already discussed to add new, valuable layers to the generation, movement, and analysis of data during and after the building phase of a project.

TAKING FULL ADVANTAGE OF THE TOOLS AVAILABLE

Of course, the question at this point is:

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Do all these tools even exist? And, if so, do they really do everything you're describing?"

The answer to both questions is "YES!" In fact, there are a number of options available on the market in just about every category outlined above, and they come with a wide range of prices and features. It's important to point out, though, that some of the capabilities described above are only available with a few solutions and only one provider currently offers all the features described for creating a truly connected jobsite:

TRIMBLE SOLUTIONS FOR GENERAL CONTRACTORS

Now, this isn't a hard-pressure sales pitch, so we want to be completely transparent about limitations and caveats:

▶ **Currently, Trimble's mobile solutions are fully developed for iPhone and iPad devices. Android users will need to access them via a web browser.**

▶ **No one-size-fits-all solution could ever cover everything every GC needs, so Trimble's connected jobsite tools utilize a modular approach with multiple applications that work with or without their counterparts in other project phases. Therefore, a full feature set will depend on which individual applications or devices you decide are of value to you.**

With those out of the way, let's take a quick look at the connected jobsite solutions available through Trimble.

ENGINEERING AND DETAILING

BIM solutions like [Tekla Structures](#) and [SketchUp](#) can provide the constructible model and drawing foundations all the other phases of construction rely on. Both of these applications support import and export of 2D and 3D files in multiple formats so all your teams can coordinate effectively with engineers working in Autodesk Revit or other CAD programs.

Detailers comfortable with AutoCAD have niche Trimble applications to choose from, such as [SysQue](#), [PipeDesigner 3D](#) or [EC CAD](#). Or, they can simply export AutoCAD files for import elsewhere. Alternatively, they can do their detailing right inside Tekla Structures (a design and detailing solution capable of producing models up to LOD 500.) In many cases, the resulting data can be fed directly to the fabrication shop — even into automated fabrication machines — creating cost- and time-effective efficiencies there too.

Additionally, the [Trimble Connect](#) platform takes that interoperability several steps further with direct integrations in Revit and other popular competitive applications across all phases of construction.

ESTIMATING AND TAKEOFF

The [GCEstimator suite](#) brings together the power of three industry-leading applications into one integrated solution that covers everything your back office needs to produce quick, accurate estimates and a unified, dynamic, and efficient takeoff:

- ▶ **Trimble WinEst** - database-driven software that uses a highly flexible spreadsheet for creating, adjusting and presenting cost estimates.

- ▶ **Trimble Vico Office** - virtual construction software that augments 3D models with constructability analysis and coordination, location-based quantity takeoff, 4D (time) scheduling and production control, and 2D electronic plan takeoff.

► **Trimble Document Controller Standard** – an application that automates change detection between design iterations in both 2D design drawing sets and in 3D models created using BIM software.

Once again, robust import/export functionality and integrations with Trimble Connect mean you can connect your jobsite in a way that fits your workflow. It also means change orders and after-the-bid adjustments can be handled quickly and efficiently. As the model changes, so does the pre-build documentation.

SCANNING AND LAYOUT

Prep work onsite can flow smoothly because the available tools facilitate accurate and efficient data transfer from the office to the field. Some of the many solutions offered to establish a connected jobsite at this stage include:

► Office and field software - Trimble applications EdgeWise and RealWorks offer the ultimate 3D scanning combination, taking scanned data and establishing workflows for incorporating it seamlessly into BIM models. Trimble Field Points and Field Link (or Field Link Office) facilitate the creation of field layout points from 2D or 3D source material, transferring the finished product to layout technicians' mobile tablets in the field.

▶ [3D laser scanners](#) - The TX series of laser scanners offer exceptional precision and ease of use when gathering as-built data for clash recognition, measurement, or model verifications.

▶ RTSs and RPTs - Trimble's [RTS series](#) of robotic total stations, [RPT600 layout station](#), and GPS-powered [R8s receiver](#) work seamlessly with Trimble Field Link software and one technician with a tablet to make a once tedious and time-consuming task much faster and less labor-intensive.
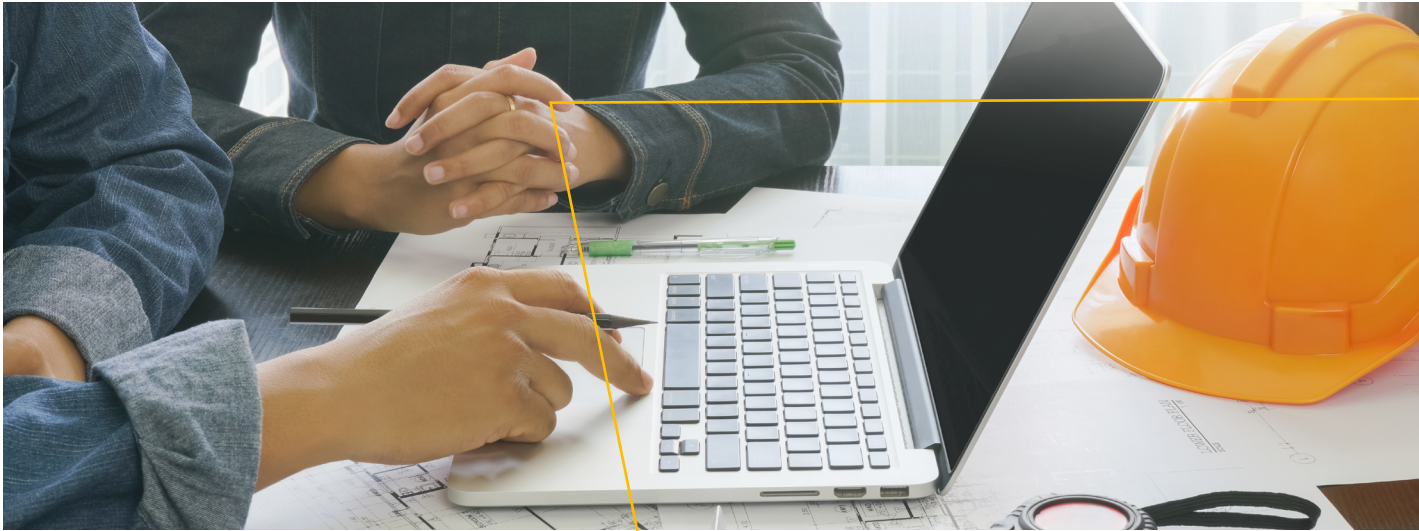
PROJECT MANAGEMENT

Via Trimble Connect, a lot of the data and deliverables described so far can be imported into popular project management solutions like MS Project, or even into a spreadsheet, if that will help. But, for thoroughly realized project management solutions designed by and for contractors with years of field experience, look no further than the SaaS-based option, [Trimble ProjectSight](#).

Both solutions offer unparalleled visibility into every aspect of the project, from budget and cost management to document control, from scheduling to quality and safety inspections. With all this information available at your fingertips in an intuitive format that works the way you do, you can constantly stay on top of all your project's vital stats.

There's also the matter of pleasing your customer in the end: the owner who's entrusted you with running this complex, large-scale project. To accomplish this simply and easily, Trimble ProjectSight integrates seamlessly with e-Builder Enterprise, the industry-leading project management solution designed for owners.

In addition, Viewpoint offers a robust set of construction software that helps professionals increase margins and lower risk. Their users consist of 8,000 construction customers across the globe.

Finally, the Vico Office suite deserves mention here, too: available as a full suite or in three separate niche applications, the Trimble Vico Office solutions augment and enhance 3D BIM models with powerful analytics and management features incorporating budgeting, scheduling, and onsite location management, among other features.

JOBSITE MANAGEMENT

While work is progressing on the physical build, safety and security is of paramount concern. You'll have at least one safety manager onsite at all times to try to mitigate risks and maintain compliance with the rules you've established and training provided. To make that safety manager's efforts both easier and more effective, you can consider Trimble CrewSight.

Trimble CrewSight incorporates standard labor tracking capabilities along with a robust, RFID-based access control system to keep your construction site secure and set up safety boundaries within the site to keep untrained or unqualified workers out of areas they shouldn't be. In the case of an emergency, CrewSight includes an emergency muster feature as well as instant access to every worker's contact information and last-known location onsite, so headcounts are fast and accurate.

Combining CrewSight with Trimble Workforce Registry, your labor-related compliance and management requirements are covered.

Another important aspect of controlling costs and preventing unnecessary slowdowns is to keep track of all the tools, vehicles, and other assets being brought on and offsite. Trimble AllTrak Cloud has you covered there too. This powerful inventory management solution was designed specifically to handle all the minutia a busy construction site needs, including:

- ► **Hand and power tools**

- ► **Supply kits**

- ► **PPE**

- ► **Rented equipment (like Porta-potties and gas cylinders)**

- ► **Vehicles**

Not only does AllTrak Cloud let you know where all these things are at any given time, it also helps you track costs on a project basis, receive reminders for routine maintenance or compliance inspections, and attach individual employee accountability to specific assets (reducing shrinkage from loss and theft).

So, after having read this guide, how close are you to enjoying the benefits of a modern connected jobsite? If you'd like some help here, click the link below to speak to an expert in the relevant technology and we'll be happy to help you.

Contact us