



Measure Progress, Productivity
and Quality with Trimble Stratus

Drone Data Analytics for Construction

Trimble Stratus





Whether you're new to drone surveying or looking to scale up your drone work, you want to know how it can help measure progress, productivity, quality and cost on your site. Here is a deep dive into how Trimble Stratus delivers on those values for civil construction.

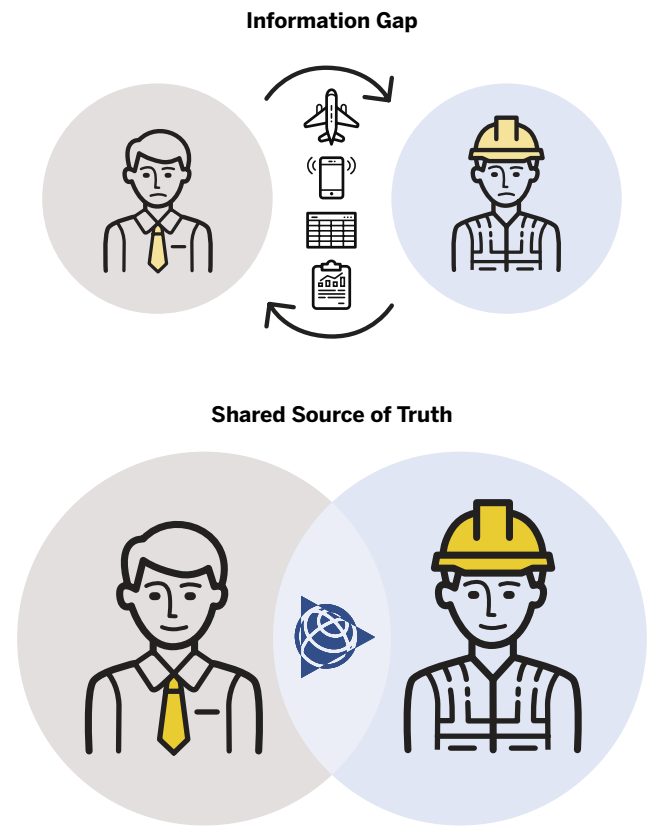
By the end of this ebook, you'll know how Trimble Stratus can answer how much work is done, how fast it's progressing, whether or not you're matching the plan, and if you're going to make money on a job.

Trimble Stratus can be used by both site personnel and the head office to:

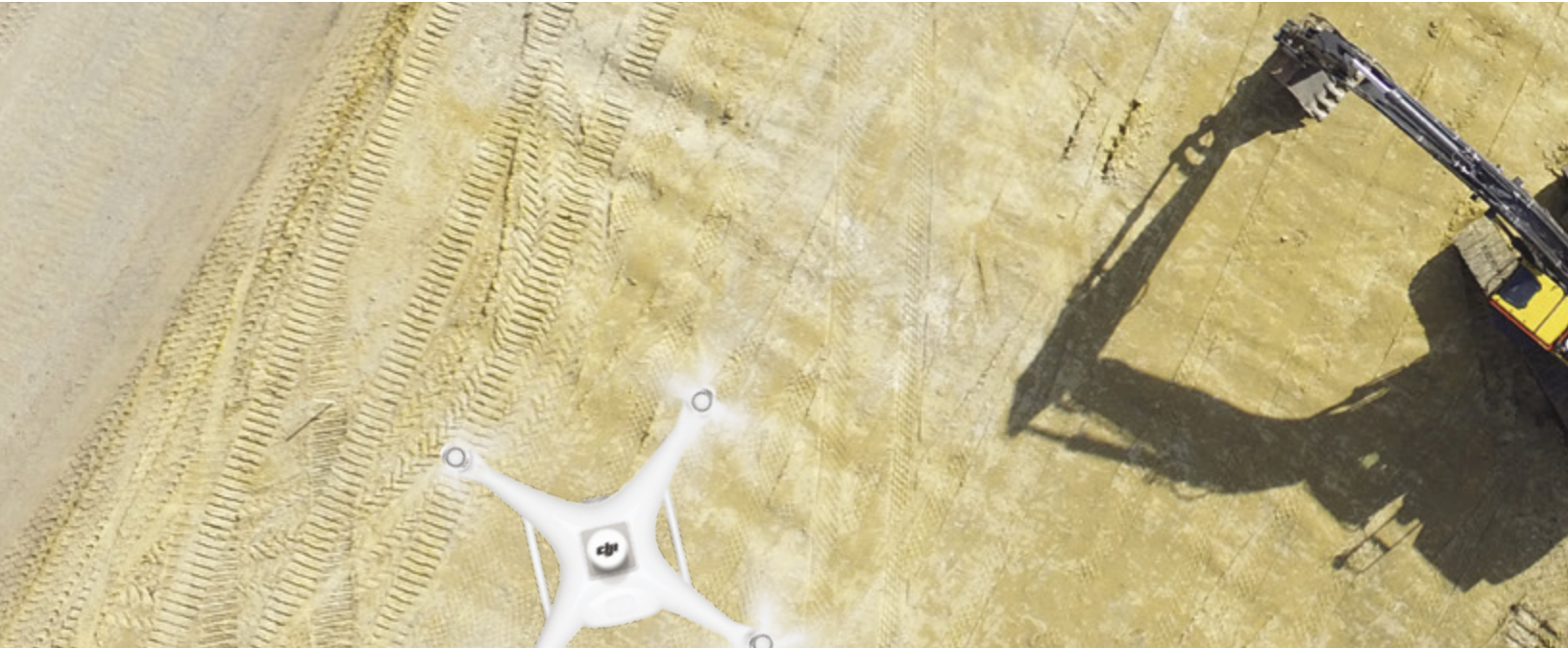
- ▶ Know your site's status
- ▶ Settle disputes easier by knowing who's moved what
- ▶ Track progress against design
- ▶ Avoid environmental fines
- ▶ Ensure safety on your site
- ▶ Troubleshoot mobile plant operation
- ▶ Collaborate using a single source of truth
- ▶ Work and plan with confidence

DRONE DATA ANALYTICS FOR CONSTRUCTION

We're going to break down how Trimble Stratus can streamline workflows to save time and, ultimately, money by closing the information gap between you and your site.



Commercial Drones are Revolutionizing Worksites



It's a fact: surveying is an irreplaceable part of construction, but it can be time consuming. Design conformance is a big deal, and you want to know as soon as possible if you're outside of design. Same goes for progress tracking.

Advances in technology have made the drone an affordable tool for worksites.

Depending on where you're located, you might not need any certification at all—as with Australia, where flying small drones at low altitudes is okay for anyone. In the US, you'd just need to get certified with the FAA.

And when it comes to actually flying to capture your survey images? That can be totally automated. The range of auto-flying apps out there make flying a drone a simple, quick process. You can usually survey an entire site in less than half a day, depending on the size of the site and the drone you're using. We recommend using an auto-flight program because it ensures even and steady flight, a vital element in capturing high-quality site surveys.

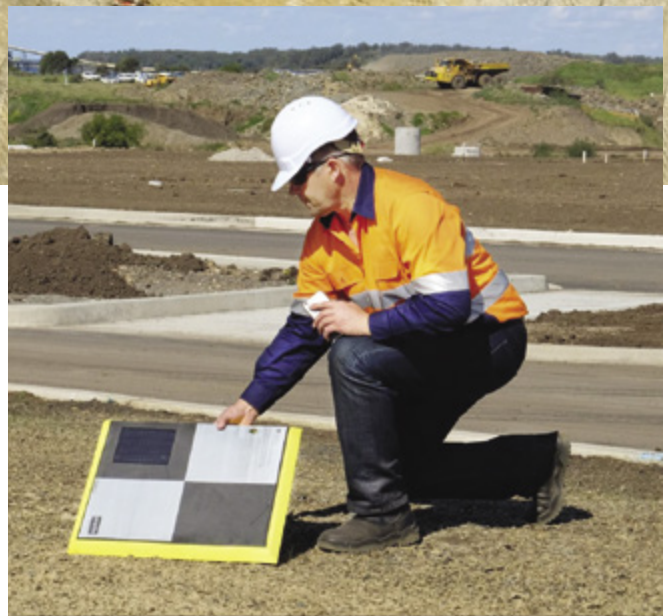




KNOW YOUR SITE'S STATUS

After you've flown your drone and photographed your site, that's where Trimble Stratus comes in. Accessed from the browser on your device, Trimble Stratus uses photogrammetry methods and our software to stitch the images together. This involves pinning the images to the ground control positions, and getting powerful machines and data experts to digest all the raw photos, find overlaps and common points in images, and make a 3D reconstruction of the terrain.

Thanks to ground control points (GCPs) and a known coordinate system (local calibration or otherwise), your data is accurate. This means you can measure right off the visual representation on your web browser. Know your site's progress and productivity in a few clicks by reviewing the site timeline and checking the physical site against your design.



AERPOINTS ARE A SMART GROUND CONTROL SOLUTION, PURPOSE-BUILT FOR DRONE OPERATIONS.

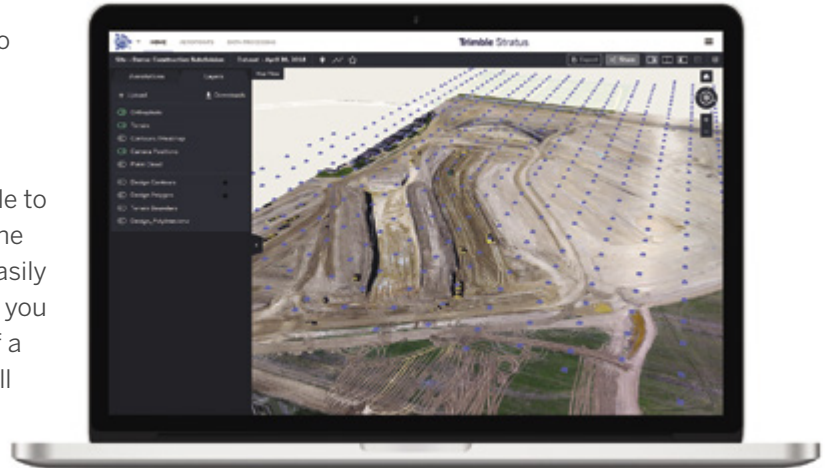
Featuring a solar panel, battery, GPS, and WiFi inside each fully sealed, rugged, lightweight unit, AeroPoints make capturing accurate data simple.

Site Management

SEE HOW MUCH HAS BEEN DONE AND WHAT'S LEFT TO DO

Using the easy-to-navigate interface takes minutes to master. You can check site volumes in seconds—and then track changes over time with our reports and timeline features.

Similarly, volume measurements are quick and simple to complete. With additional calculators, you can take the guesswork out of tonnage measurements. You can easily see and measure how much dirt has been moved, so you can quickly understand the numbers of how much of a particular job has been completed and how much still needs to be done.



MONITOR SITE PRODUCTIVITY AND QUALITY

Of course, knowing how you're faring against design is the main goal. Trimble Stratus allows for uploads of design surfaces and linework. This gives you an overlay on the 3D site survey, which instantly highlights how you're progressing and if your work is to specification. It takes the guesswork and abstraction out of the process, and lets you have a visual conversation with your team or your boss.

With more regular progress and productivity and progress tracking, you can spot problems before they become expensive. Think of it as the difference between planning ahead and simply reacting.

Traditionally, by the time information gets to you about a mistake, it's all you can do to just put out fires and maybe start work over. But because drones are more cost effective and efficient, you can fly as frequently as you want to gather data, thus closing the information gap between you and your site.



A SINGLE SOURCE OF TRUTH

In the day-to-day management, any number of issues can come up. But you're also dealing with contractor management and efficiency. No one wants to move someone else's dirt.

With drone surveys you have a visual, detailed account of whose dirt went where and when. The timeline tool in Trimble Stratus allows you to slide between survey dates from one flyover to the next, or to design, or see a progression of changes in a cross-section view.

Having a paper trail and easy-to-understand visuals enable you to settle disputes if they come up and troubleshoot problems as they happen to avoid legal complications or fines in the first place. For example:

- ▶ Simply because they could not accurately track progress to prove the dirt wasn't in their scope of work, a civil contractor in California was spending upwards of \$2M every year on unforeseen earthworks projects. By using Trimble Stratus to unlock real-time insights on earthwork movement on site the contractor was able to identify earthwork discrepancies as the project progressed and submit data-driven change orders, ultimately increasing net profits by \$2.5M, a 50% increase.
- ▶ One Australian company was billed for 1M cubes of earthworks, but only 750,000 had been moved. At \$5.00 per cube, they were looking at a \$1,250,000 loss, but they're getting it all back because they can prove it with Trimble Stratus.

With Trimble Stratus, simple sharing and permissions options enable transparency between you, your team and other stakeholders. Avoid mistakes and misunderstandings by working from a single source of truth.

TRACK PROGRESS AGAINST DESIGN

Regularly checking your site against design goes a long way. Spotting a problem before it becomes expensive is ideal, but is not typically a part of the status quo. Trimble Stratus wants to change that.



Shareable, version-controlled 3D site surveys go a long way to resolving these issues. With Trimble Stratus, you can have an unlimited number of view-only users and a designated number of admins—all working off the same, up-to-date information. Uploaded design surfaces can be viewed at any time against any survey captured for that site.

This removes the conversation barriers that arise when you use drawings or visual inspections to gauge where you're at against design.

A trained engineer might have no problem visualizing the plan in their mind, but if you want to brief one of your team members—or your boss—it's easier to take abstraction out of the conversation.



Using the 3D site survey, not only can you "walk" someone through different areas, you can also turn on the design overlay (also in 3D), and show them how the site today compares to the final schematic.

An Australian construction company was saved from digging in the wrong direction in two to three days with Trimble Stratus. The end-of-life plan had been accidentally put in the GPS, which usually wouldn't have been noticed for a few weeks. Estimated \$300,000–400,000 saved (one week with 30,000 cubes at \$5.00/cube).

≡ Staying Within the Lines



AVOID ENVIRONMENTAL FINES

Depending on where you're building, you might have more than just the regular restrictions to contend with. You might have to plan around and keep an eye on environmentally protected areas.

To avoid any fines associated with failed inspections or violations, you need to keep tabs on your site boundaries and no-go zones. In addition to the benefits delivered with more frequent surveys and a visual 3D interface, you can mark off protected areas on your site and share them with your team. This gets everyone on the same page easily and highlights exactly where they need to be cautious.

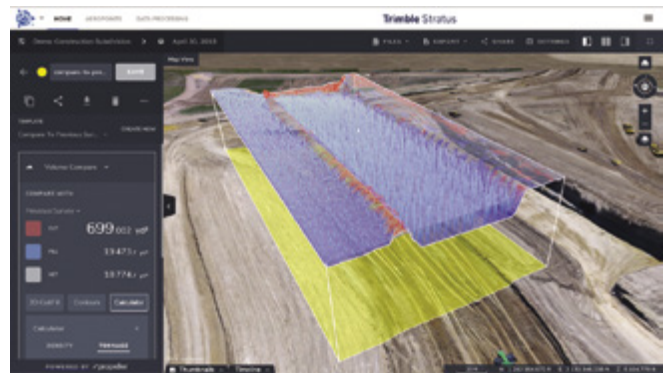
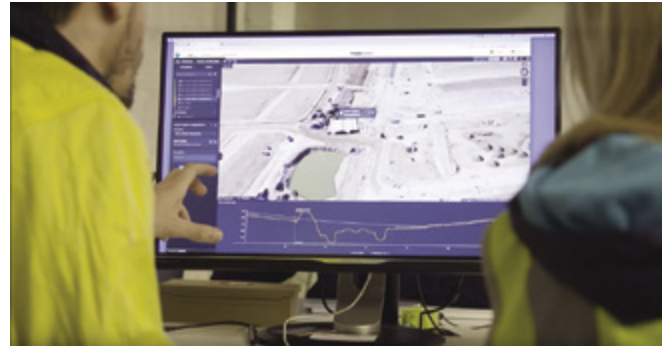


ENSURE SAFETY ON YOUR SITE

The first priority on any site is safety. From everyday safety plans to inspections to traffic management, safety is in everything you do. However, these things take time and resources to get right, and they are mandatory. Trimble Stratus allows you to trim time and manhours off these tasks, thanks to that easy-to-navigate and shareable 3D survey we've been going over here. Because the surveys are accurate and up-to-date, the need for in-person inspections are decreased, or sometimes eliminated.

With the line tool, you can quickly measure haul roads to ensure they meet safety standards. Short- and long-term traffic management can be streamlined with accurate, bird's eye visuals of assets, past vehicle movement, and existing roads.

And, of course, we can't underestimate the value of accurate and up-to-date site maps. Both the orthophoto and individual shots are accessible and downloadable from Trimble Stratus. Use them however you like: tack up the site photo in the office, use it to map out that day's route with your team or visitors, etc.



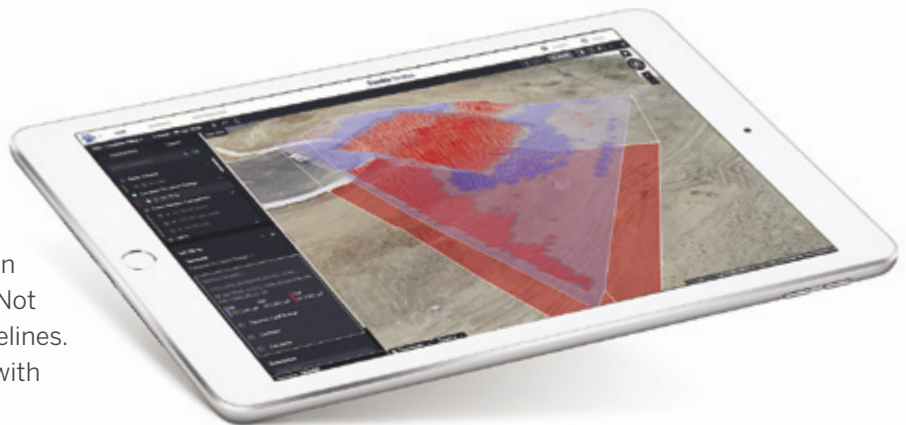
Remote Access

TROUBLESHOOT MOBILE PLANT OPERATION

Even small alterations from haul road design can mean an increase in cycle times and fuel burn. Not to mention falling outside of proper safety guidelines. The time, legwork, and safety risks associated with monitoring and fixing those issues add up.

With drone surveying and Trimble Stratus, you no longer need to leave the office to troubleshoot any of it. Because the 3D survey is accurately mapped and rendered, you can measure grades and cross-slopes directly in your web browser. Check road widths and windrow heights in one click. With those measurements in hand, you can compare them against design and standard safety requirements. With your design surface uploaded into Trimble Stratus, you can see the comparison visually and share that view with your team. Simple, accurate visuals make any conversation about the physical plant easier to understand.

It's hard not to overstate the value of being able to survey more often. With frequent data capture, you can take the pulse of your site and do inspections via Trimble Stratus remotely. Monitor and stop problems before they become expensive or require starting work over. Check conformance to mobile plant efficiency guidelines as often as you like with just a couple clicks. See changes in roads over time with the timeline tool that easily connects past surveys into a visual timelapse.



COLLABORATE USING A SINGLE SOURCE OF TRUTH

Everyone reports to somebody. Collaboration and reporting should be painless, but it's often anything but. And collaboration challenges span the entire life of any project. At each stage, ensuring the right parties have the information to understand a project's needs and complete their work on time, on budget, and to specification is critical to success. Check if estimates are correct, measure progress quantities, and accurately compare the initial survey to the actual initial site status.

Because Trimble Stratus is a browser-based tool, it means that anyone with an internet browser can use it without installing complicated programs. Personnel back at the main office at the edge of the site—or miles away—can see the same information and share measurements and notes with the whole team.

It houses everything in the same place: your present and past surveys; your designs and any iterations; your notes; your reports; and, of course, all your files in the formats you require. This makes access and collaboration, whether with the head office or your on-site team, painless.



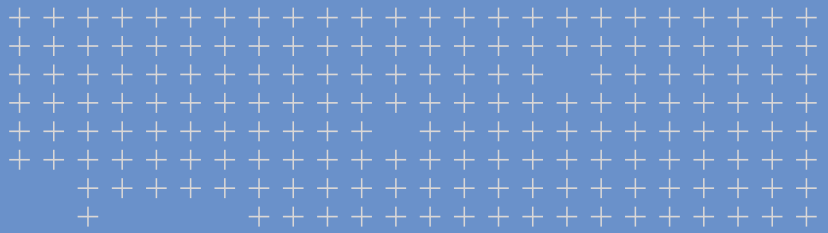
WORK AND PLAN WITH CONFIDENCE

Trimble Stratus has no limits on the number of view-only users you can share your site with, making it simple and cost effective to give everyone the best collaboration solution available. You can set permissions for different teams or individuals, as you see fit.

Measuring and managing your site with drone data analytics saves on time, money, and mistakes. As we've seen, Trimble Stratus gives you the power to see the status of your site in minutes, measure volumes with a few clicks, troubleshoot frequently, and, with rock solid data and a timeline for the life of your site, resolve disputes should they arise. Never move someone else's dirt again.



Additionally, Trimble Stratus has readable, ready-to-go reports in both CSV and PDF that you can pull to send to your boss or your direct reports. These and Trimble Stratus overall can help mitigate delays due to inclement weather, accidents, bad estimates, and more. With Trimble Stratus, you can close the information gap between you and your site.



Trimble Stratus: Real Solutions

Here are a few examples of how real people are solving real problems with Trimble Stratus:

- ▶ “Trimble Stratus gives us the ability to compare underground field work to construction models quickly and accurately, this enables us to have more efficient and effective coordination meetings.”

— **Hamzah A. Shanbari**, *Haskell*

- ▶ “I can go out and fly a site in two to three hours and then just upload everything to Trimble Stratus and come in the next day, and it’s done. If I have a question, I can just email someone and usually within a few hours— or within 24 hours—I have a solution back. It simplified everything that we do.”

— **Jim Croan**, *JRC Construction*



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