



Take the Guesswork Out of Earthworks

# Trimble GCS900 Grade Control Systems

# Done Right the First Time



Trimble sets the standard for construction technology by developing highly productive, integrated and innovative solutions for the complete job site. Trimble® GCS900 Grade Control Systems help contractors finish faster with less rework, less staking, less checking, lower costs and improved material yields. Plus, it quickly pays for itself—often on the first project!

Performing earthworks smarter, faster and more profitably is critical to success in today's highly competitive construction industry. You need to perform all parts of the job faster and more accurately than ever before. From estimating to completion, the Trimble GCS900 Grade Control System is truly revolutionizing the total construction process.

Trimble offers you the most complete line of Grade Control Systems that are easy to use, fully upgradeable and flexible enough to meet a wide range of application and job site requirements. There is simply no better solution to meet the challenges of today's schedules and budgets.

Gain a competitive edge, streamline your operations, and improve your bottom line with Grade Control Systems from Trimble, the company that invented grade control.

## GET THE JOB DONE RIGHT THE FIRST TIME

The Trimble GCS900 Grade Control System is ideal for bulk earthworks, compaction and finished grading. It allows even lesser skilled operators to work faster, more consistently, and with less rework.

Getting the job done right the first time eliminates rework. With design information at your fingertips, the need for stakes, hubs or stringlines is eliminated. Through improved productivity, personnel and machine costs are also reduced, and you can carefully control material usage.

Spend more time being productive and less time waiting for surveying and grade checking. With information displayed in the cab, operators can finish jobs faster with minimal supervision—even in extreme conditions.

## TRIMBLE READY

Trimble works with leading machine manufacturers  to reduce the effort required to install Grade Control components. Today, Trimble Ready® machines come pre-installed with wiring and brackets for common system configurations. This simplifies GCS900 system installation and lets you easily move the components from one machine to another.

## DEPENDABLE TECHNOLOGY. DEPENDABLE SUPPORT.

SITECH is the leading global distribution network for the most reliable, rugged and complete portfolio of construction technology systems available to the heavy civil contractor. 

The experienced construction professionals at your SITECH dealership will advise you on the right technology for your job and provide you with local customer service, personalized training and technical support. If you're new to construction technology, your local SITECH dealer will get you up to speed and will be there to help you through every step of the implementation.

With Trimble technology and SITECH support on your sites, you're in a stronger, more competitive position. You'll experience new levels of productivity and be profitable, project after project.

## THE CONNECTED MACHINE

All GCS900 Grade Control Systems come Trimble Connected Site® ready, with Connected Machine technology to keep the jobsite working without delays and downtime.

Design updates and progress reports can flow wirelessly between field and office in real-time, maximizing machine and operator productivity. Contractors can use Trimble Remote Assistant to diagnose problems quickly, without the cost and expense of waiting for a technician to visit the site. Information from the Connected Machine is shared with project owners in the form of accurate, timely information, lower bids, managed costs and reduced risk factors that win contracts in a competitive market.

Trimble GCS900 Grade Control Systems now include everything you need to connect your machine, and your SITECH® distributor will be with you every step of the way to make sure your machines are well connected.

 *Look for this symbol to see which systems come standard with Connected Machine functionality or are Connected Machine components*



# Scalable Control



## TRIMBLE 2D GRADE CONTROL SYSTEMS FOR SMALL SITES

Trimble's productivity-enhancing Grade Control Systems are scalable and can be configured for just about any machine or job. All Trimble Grade Control components have been designed for ease of use, quick setup and extreme durability to ensure the highest uptime and longest life possible.



Connected Machine functionality is included in all 2D Grade Control Systems from Trimble. Connected Machine solutions decrease machine downtime, and can reduce rework and miscommunication by wirelessly sending data between the machine and the office. When combined with VisionLink®, Trimble's asset, fleet and site productivity management software, you get better control of your fleet and your site.

### Grading

An excellent first investment for contractors new to construction technology.

A single laser and laser receiver are used to measure the lift and tilt of the blade. To measure the slope of the blade, add another laser receiver or a slope sensor. An in-cab Trimble CB450 or CB460 Control Box provides elevation and slope guidance, so you can more accurately and quickly get to grade.

Trimble 2D Grade Control can easily be upgraded to a 3D Grade Control System.

- ▶ MACHINE TYPES: dozers, motor graders and compact grading attachments
- ▶ COMMON APPLICATIONS: housing and building site pads, road maintenance, ditches, commercial building sites and sports fields

### Finished and Fine Grade

2D Grade Control gives you precise vertical guidance necessary to achieve tight tolerances and a smooth finished grade.

Two angle sensors and a rotation sensor can be used in finished grade applications to calculate the cross-slope of the blade. Adding a laser receiver or a sonic tracer gives you the ability to measure elevation when required. Additionally, when using the a sonic tracer, the system allows for stringline, previous pass, or curb and gutter tracing.

- ▶ MACHINE TYPES: dozers, motor graders and compact grading attachments
- ▶ COMMON APPLICATIONS: road construction, sports fields, embankments, housing and building site pads

### Excavation

Ideal for earthmoving contractors looking to improve their excavation productivity and profitability.

Trimble 2D Grade Control uses an angle sensor, dual axis sensor and laser catcher to measure the relationship between the body, boom, stick and bucket. This determines where the bucket teeth are, and where they should be, to guide the operator to the desired depth and slope.

The system also offers the flexibility to upgrade to a 3D Grade Control System.

- ▶ MACHINE TYPES: excavators
- ▶ COMMON APPLICATIONS: residential and commercial sites, road construction, trenches, ditches, finished slope work, dredging and waterways



# Ultimate Productivity



## TRIMBLE 3D GRADE CONTROL SYSTEMS

From bulk earthmoving through grading to finished material compaction, Trimble has a 3D Grade Control solution for your machine type and application requirements. Ask your SITECH distributor about the appropriate 3D sensor option—GNSS or total station-based systems—then use the same components across your entire fleet, through the life cycle of the project.



All Trimble 3D Grade Control Systems come standard with Connected Machine functionality. Wirelessly transfer data between the office and the machine, and manage asset, fleet and site productivity with VisionLink software powered by Trimble.

### Bulk Earthworks

Design information and live cut/fill indications are displayed in the cab, allowing excavation to be done in a safer, stakeless environment.

The system provides real-time information for monitoring avoidance zones and simultaneously collects as-built data as the machine cuts to grade. With these capabilities, operators can keep tighter control over safety issues and see precisely where dirt is being moved on site.

- ▶ MACHINE TYPES: dozers, excavators, motor graders and wheel loaders
- ▶ COMMON APPLICATIONS: land reclamation, dam and reservoir construction, new infrastructure projects, landfills and waste deposits

### Grading

Get to grade faster and more accurately than ever, even with complex designs.

The on-board Trimble control box determines the position of each tip of the blade and compares it to the design elevation to compute cut or fill to grade. The cut/fill data is used to drive the valves for automatic blade control, or is shown on in-cab lightbars that provide visual guidance for manual operation.

- ▶ MACHINE TYPES: dozers, graders, excavators, scrapers and compact grading attachments
- ▶ COMMON APPLICATIONS: Highway and railway construction, and residential and commercial site construction.

### Compaction

The Trimble CCS900 Compaction Control System helps you accurately control the compaction process, while reducing unnecessary passes that result in over compaction.

The system achieves target compaction faster, more accurately, with less rework. The early detection of unsuitable materials and hidden obstructions can be excavated and re-graded or compacted prior to more costly phases of the construction process. Compaction results are recorded and stored for analysis and generation of documentation deliverables at the end of the project.

- ▶ MACHINE TYPES: two-drum and four-drum soil compactors
- ▶ COMMON APPLICATIONS: highway and railway construction, residential and commercial site construction, parking lots and sports fields

### Finished and Fine Grade

Achieve finished grade to millimeter accuracy with fewer passes.

By maintaining tight tolerances every time, a GCS900 system results in higher quality work delivered to the client. Finished grade materials can be placed more accurately and in a shorter time period, keeping the material costs to a minimum and realizing better profits.

With more confidence in the cost of operations and quicker completion to finished grade, the equipment owner is able to lower bids and gain more business in every phase of the project.

- ▶ MACHINE TYPES: dozers, motor graders and compact grading attachments
- ▶ COMMON APPLICATIONS: highway and railway construction, airport construction, concrete pours and slab placement, and residential and commercial site construction.



# The Right Fit for Every Job

## CONNECTED MACHINE COMPONENTS

### Trimble CB450 Control Box

Designed for use in harsh construction environments, the Trimble CB450 Control Box gives the operator a full-color graphical display for easy viewing and guidance to grade. Features include:

- ▶ 4.3" (10.9 cm) full-color LCD display with adjustable backlight controls
- ▶ Audible tones for real-time grade guidance or warnings and alerts
- ▶ Four led lightbars to provide grade guidance at a glance



### Trimble CB460 Control Box

The Trimble CB460 Control Box is the premium display for all machine types in the Grade Control System portfolio. The CB460 offers the same key features as the CB450, plus:

- ▶ A large, easy-to-read 7" (17.78 cm) full-color LCD display
- ▶ Support for external lightbars
- ▶ Faster data transfer via Ethernet connection



### Trimble SNM941 Connected Site Gateway

Connect your machine with rugged hardware from Trimble. Featuring both Wi-Fi® and cellular connectivity, the SNM941 enables wireless data transfer of design files and GNSS corrections, and fleet, asset and site productivity information.



## 2D COMPONENTS

### Trimble GL700 Series Grade Laser

Spectra Precision Laser GL722 Series Grade Lasers provide years of durable, precise machine guidance with GCS900 2D Grade Control Systems, the GCSFlex Grade Control Systems and laser-based compact machine installations. Ideal for site preparation, trenching and pipe laying, fine grading and road construction, the GL700 lasers can help you get to grade faster with more accuracy.



### Trimble ST400 Sonic Tracer

The ST400 is mounted to the blade and uses a physical reference such as curb and gutter, stringline, existing or previous pass as an elevation reference.



### Trimble SR300 Laser Receiver Mast

The SR300 is mounted on the blade and used with the GL series Grade Laser. It can be upgraded with a Trimble GNSS Smart Antenna for blade control to 3-6 millimeters (0.01 to 0.02 feet).



### Trimble LR410 Laser Receiver

The LR410 is mounted to an electric mast on the blade and connected to the machine hydraulics to control lift to an accuracy of 3-6 millimeters (0.01 to 0.02 feet).



## 3D COMPONENTS

### Trimble GNSS MS995 Smart Antenna

The MS995 contains an integrated GPS+GNSS receiver, antenna, and isolation system all in a single, durable housing. It uses the advanced Trimble RTK engine for faster initialization times when satellite lock is lost and enhanced performance near obstructions.



### Trimble Total Stations

Trimble SPS Series Universal Total Stations can be used for even greater accuracy when performing fine or finished grading, with blade guidance to 2-5 millimeters (0.007 to 0.016 feet).



### Trimble GNSS MS975 Smart Antenna

The MS975 offers a cost-effective alternative for contractors who need a highly accurate GNSS receiver at a lower price point. It is optimized for cab or machine body mount only.



### Trimble SR300 Laser Receiver Mast

When improved vertical accuracy is needed, the GNSS systems can be enhanced with the Trimble SR300 Laser Receiver Mast for blade control to 3-6 millimeters (0.01 to 0.02 feet).



### Trimble SNR On-Machine Radios

Rugged Trimble on-machine radios offer a modernized platform for communicating with Trimble Universal Total Stations or with a fixed GNSS base station. Available in:

- ▶ Single-band 450 MHz, 900 MHz, and 2.4 GHz
- ▶ Dual-band 900 MHz + 2.4 GHz and 450 MHz + 2.4 GHz



## TRIMBLE GCS900 2D GRADE CONTROL SYSTEMS

Recommended Configuration	Target Machines	Description	Key Components
<b>CROSS-SLOPE ONLY</b>	Dozers, Graders, Compact Grading Attachments	Cross-slope control system to be used on motor graders for fine grading work for road maintenance, ditches and slope work	2 angle sensors, Rotation sensor, Control box, SNM941
<b>SINGLE ELEVATION PLUS CROSS-SLOPE</b>	Dozers, Graders, Compact Grading Attachments	Single control system uses a laser or sonic receiver to control the lift of the machine blade and the cross-slope for flat, slopework, and finished grading	Laser, Laser receiver -or- Sonic tracer, Rotation sensor, 2 angle sensors, Control box, SNM941
<b>DUAL ELEVATION</b>	Dozers, Graders, Compact Grading Attachments	Dual control system that uses two laser or sonic receivers for higher accuracy lift control. Blade edge can be controlled independently or linked	Laser, 2 Laser receivers - or- 2 Sonic Tracers, Control box, SNM941
<b>DEPTH, SLOPE, AND ELEVATION CONTROL</b>	Excavators	Highly flexible system for excavation, trenching, grading and profile work	Angle sensors, Laser catcher, Control box, SNM941

## TRIMBLE GCS900 3D GRADE CONTROL SYSTEMS

Recommended Configuration	Target Machines	Description	Key Components
<b>SINGLE GNSS</b>	Dozers, Graders, Scrapers, Excavators, Compact Grading Attachments	Measures the position and slope of the blade and compares that to design data for grading and mass excavation on complex design surfaces	Angle and rotation sensors, Single GNSS Smart Antenna, Control box, Rugged on-machine radio and SNM941
<b>DUAL GNSS</b>	Dozers, Graders, Scrapers, Excavators, Compact Grading Attachments	Measures the exact position, cross slope and heading of the blade, bucket, drum for rough grading and mass excavation on steep slopes and complex design surfaces	Dual GNSS Smart Antennas, Control box, Rugged on-machine radio and SNM941
<b>CAB-MOUNTED SINGLE GNSS</b>	Dozers, Wheel Loaders	Measures the position of the blade on the ground, comparing that to the 3D design for rough grading applications	Single GNSS Smart Antenna, Control box, Rugged on-machine radio and SNM941
<b>SINGLE OR DUAL GNSS WITH LASER AUGMENTATION</b>	Dozers, Graders	Single and dual GNSS systems enhanced with laser augmentation to improve vertical accuracy for high accuracy guidance to complex design surfaces such as super-elevation grading for rough through finished grade work	Single or dual GNSS Smart Antenna(s), Laser receiver, Control box, Rugged on-machine radio and SNM941
<b>UNIVERSAL TOTAL STATION</b>	Dozers, Graders, Excavators, Soil Compactors, Compact Grading Attachments	Total station-based system for high accuracy lift and layer control, material placement and monitoring, or for jobs where GNSS is not the ideal solution because of overhead obstructions	Single on-machine active target, Control box, Universal Total Station, Rugged on-machine radio and SNM941
<b>3D + SONIC</b>	Graders, Compact Grading Attachments	Uses 3D control on one blade tip and a sonic tracer on the other blade tip to match an existing structure, feature or the last machine pass	On-machine active target -or- GNSS Smart Antenna(s), Sonic tracer, Control box, Rugged on-machine radio and SNM941

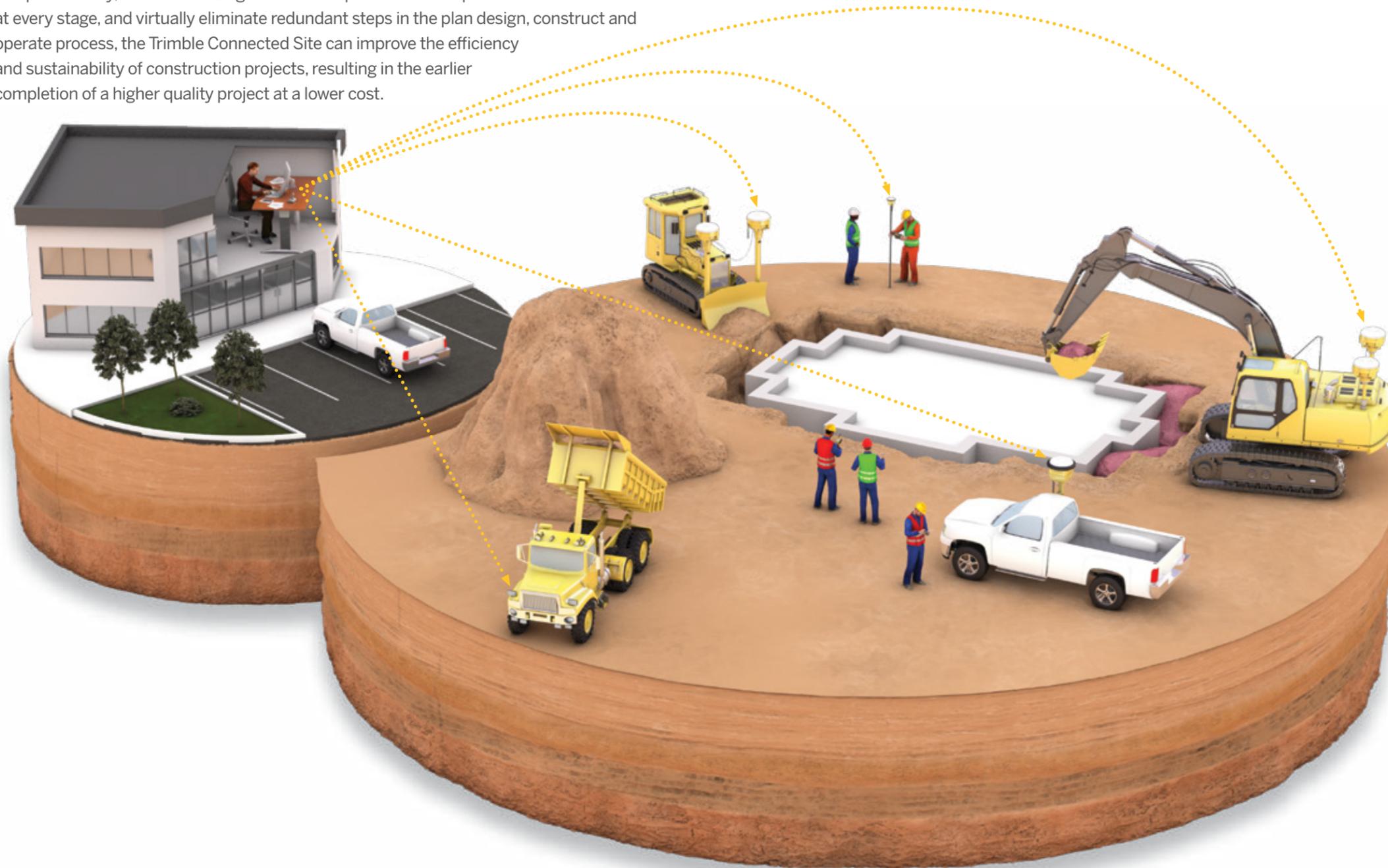
## TRIMBLE CCS900 3D COMPACTION CONTROL SYSTEM

Recommended Configuration	Target Machines	Description	Key Components
<b>SINGLE GNSS</b>	Two-drum or Four-drum Soil Compactors	Continuous compaction control and documentation for soil compaction with real-time material compaction mapping and detection	Single or dual GNSS Smart Antenna(s), Compaction sensor, Control box, Rugged on-machine radio and SNM941

# Connect for Better Control

## NEVER LOSE SIGHT OF THE SITE

When used together, Connected Office, Connected Controller and Connected Machine solutions revolutionize the way construction is done and create the Trimble Connected Site. The Trimble Connected Site transforms the construction industry by utilizing technology to improve efficiency and productivity, while minimizing waste and expense. With the potential to save time and cost at every stage, and virtually eliminate redundant steps in the plan design, construct and operate process, the Trimble Connected Site can improve the efficiency and sustainability of construction projects, resulting in the earlier completion of a higher quality project at a lower cost.



## Connected Site Solution Components

### Connected Machine



Now standard in all Trimble Grade Control Systems, the Trimble Connected Machine solution helps contractors manage their assets and see what machines are doing. Machines can collect as-built measurement data for office delivery, and receive GNSS corrections using the Internet. A 3D design created in the office can be sent to the machine operator for faster, more precise grading and earthmoving. Support can be delivered remotely, without ever leaving the office. Additionally, the machine can be used for volume measurements, so expensive measurements by grade checkers occur less frequently. Drive time and rework are also minimized, as both the office and machines in the field are kept up-to-date with the latest information.

### Connected Office



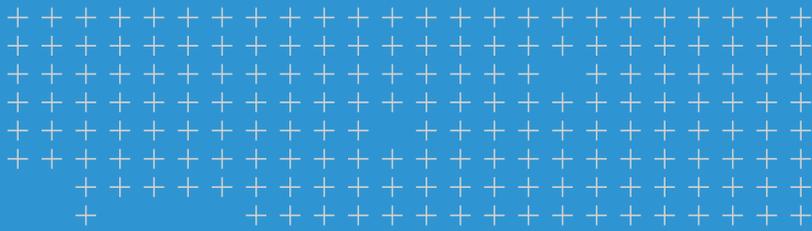
The Trimble Connected Office solution allows contractors to create 3D construction models, perform data preparation and takeoff, wirelessly sync data, monitor site productivity, and manage fleets and assets. The 3D design model created in the office can be sent to machines and controllers in the field, increasing efficiency, reducing rework and saving money. Additionally, a complete view of site productivity including materials quantity and movement, volume and compaction data, and fleet and asset management information can be shared across the organization to enable rapid decision-making and better communication.

### Connected Controller



The Trimble Connected Controller solution wirelessly syncs Trimble Site Positioning Systems in the field with the office and allows the Trimble controller to receive GNSS corrections via the Internet. A grade checker can receive the design model, create new measurements and then send the measurement and stakeout results back to the office for review. Design changes originating in the office can also be sent to the controller so field crews are rapidly updated with current information. All of this is accomplished without personnel ever leaving the site or their desk, dramatically increasing productivity and reducing costs.





# Trimble: The Construction Technology Standard

Trimble provides the tools and support to let you integrate planning, design, site positioning, machine control and asset management information throughout the construction life cycle for more efficient operations and higher profits. Visit your SITECH® technology dealer today to learn how easy it is to utilize technology that makes significant improvements in project workflow, dramatically increases your production, improves your accuracy and lowers your operating costs.



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