

Central Valley Chapter - California Land Surveyors Association
www.californiacentralvalleysurveyors.org/printing-press/



Central Valley Chapter THE PRISM



All Chapter meetings are
 "To be Determined at this time."
 Below is a list of scheduled dates:

July 28, 2021
 August 25, 2021
 September 22, 2021

Please see the Chapter website at
<https://californiacentralvalleysurveyors.org/printing-press>
 for more information.

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Announcements

CHAPTER NEWSLETTER GOES QUARTERLY

The Central Valley Chapter's newsletter, The Prism, will be released quarterly, instead of bi-monthly.
 Go to <https://californiacentralvalleysurveyors.org/printing-press/newsletter/> to subscribe or view
 Current and past editions.

SURVEY EXAM SCHEDULE

FS (LSIT) - Computer based, offered year round
 PS (NCEES LS) - Computer based, offered year round
 CA LS - OCTOBER 26, 2021

CLSA BOARD OF DIRECTOR'S 2021 MEETING SCHEDULE

JULY 31, 2021 (hopefully in person)
 NOVEMBER 6, 2021 (location TBD)

If you have news or an event that you would like to announce, send it
 to: editor@californiacentralvalleysurveyors.org

2021 Chapter Officers

President: Will Paul
 Vice President: Landon Blake
 Secretary: Dani Cano
 Treasurer: Rich James
 Chapter Director: Tristan Higgins
 Chapter Director: Landon Blake
 Alt. Chapter Dir: Will Paul
 Alt. Chapter Dir: Rich James

2021 Chapter Committees

By-Laws Committee: Open (Chairman)
 Education Committee: Open (Chairman)
 Membership Committee: Rich Brown (Chairman)
 Monument Pres Committee: Mike Quartaroli (Chairman)
 Newsletter: Rich Brown (Editor)
 Professional Practices Committee: Mike Quartaroli (Chairman)
 Website: Landon Blake (Web Master)

2021 Chapter Programs

Public Outreach Committee: Zachary Wong (Coordinator)
 Workshops: Open (Coordinator)

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Classes, Training, and Continuing Education

Mark Your Calendars

CAD Masters - AutoCAD Level I (3-Day Course)

June 1-3, 2021 Walnut Creek
 June 14-16, 2021 Sacramento
 June 28-30, 2021 Walnut Creek
 July 12-14, 2021 Sacramento
 July 26-28, 2021 Walnut Creek
 Aug 9-11, 2021 Sacramento

[Register here](#)

CAD Masters - AutoCAD Level II (2-Day Course)

June 7-8, 2021 Walnut Creek
 June 28-29, 2021 Sacramento
 July 19-20, 2021 Walnut Creek
 Aug 12-13, 2021 Sacramento

[Register here](#)

CAD Masters - AutoCAD Level III (1-Day Course)

June 6, 2021 Walnut Creek
 June 21, 2021 Walnut Creek
 July 22, 2021 Sacramento
 Aug 5, 2021 Sacramento

[Register here](#)

CAD Masters - Civil 3D for Surveyors (2-Day Course)

Aug 9-10, 2021 Walnut Creek
 Sept 22-23, 2021 Sacramento

[Register here](#)

CAD Masters - Civil 3D Introduction (3-Day Course)

June 1-3, 2021, Walnut Creek
 June 7-9, 2021, Sacramento
 July 6-8, 2021, Sacramento
 July 19-21, 2021, Walnut Creek
 Aug 2-4, 2021, Sacramento
 Aug 16-18, 2021, Walnut Creek

[Register here](#)

CAD Masters - Civil 3D Advanced (2-Day Course)

June 1, 2021 Sacramento
 July 12, 2021 Walnut Creek
 Aug 23, 2021 Sacramento

[Register here](#)

Lorman Training - Subdivision Map Act in California

On Demand, Webinar

[Register here](#)

If you have information about a training or class, please submit to: editor@californiacentralvalleysurveyors.org

Message from the Editor



THE SURVEYOR'S OF TOMORROW

As I glance at Surveying as a profession, I see that the number of active surveyors is gradually dropping. So, I take a closer look. The profession itself is not a glamorous one. Yes, we get to play with fancy electronic equipment and work outside, but that is only a portion of the work required to do the job. First we get to go through piles of documents doing research, looking up deeds and easements and sometimes really old plats. Then when we get all the research completed we get to hike, sometimes for miles, packing our gear. Looking for a specific rock or tree, or maybe even a fence post. When we find what we are looking for, then sometimes we get to dig, and dig, and dig. All, this just to find something else we are looking for. Sometimes we find it, sometimes we don't. It's the thrill of the search! It can be pretty amazing, finding something that was set a hundred years ago.

To find evidence of what was there before. That is the total rush!

Now, as our population grows, and we are forced to be closer together the era of the BIG parcel is coming to an end. People are moving to the country and parcels are getting smaller and smaller. I feel that the need for surveyors is greater than ever before. The problem I see is that most kids today don't have a clue as to what a Professional Land Surveyor is. We need to start educating them while they are still influential. We all need to share our experiences, our passion, our stories. Go out and mentor a young person. Teach them about our profession. Show them all the "awesomeness" that it is to be a Surveyor. So let's recap my thinking a minute; you get to work with documents that could be hundreds of years old, work in the beautiful outdoors, solve complex math problems, understand and utilize boundary law and operate sophisticated electronic equipment. All to find monuments that were put in the ground by a professional surveyor before us.

When you take a closer look at our profession, I really don't see why we are not having to expand our schools that teach surveying. Why are our numbers going down and not up?

If you would like to comment on this topic or suggest another, please submit it

to: editor@californiacentralvalleysurveyors.org

Monument Obituaries

By Mike Quartaroli, PLS



CLSA **CENTRAL VALLEY CHAPTER** Survey Monument Conservation Committee



USA WAS CALLED OUT
WAS A LAND SURVEYOR CONSULTED?



ARE PROPERTY CORNERS IN JEOPARDY?
WHERE IS THE PROPERTY LINE?
ARE YOU DEEP RIPPING IN THE ROAD RIGHT-OF-WAY?
WHAT HAVE YOU DONE TODAY
TO PRESERVE SURVEY MONUMENTS?

Ask about the "Adopt A Monument" program. Make a lasting contribution to the Land Surveying Profession.

Paid for by the Survey Monument Conservation Committee

State News

Surveying Education

By Richard Stephan, PLS

The formal education of the Land Surveyor, or the lack of it, is a much discussed subject and has been for many years. One can read material written on this subject 20 years ago and the ideas expressed are basically the same as those being written today.

The progress made over the past 20 years has been almost nil. The time for offering excuses and explanations has expired. Today we are interested in what can be done to correct an unacceptable situation. Our concern must be action, not interminable discussion.

Our rapidly expanding technology now requires the teaching of subjects which did not even exist 20 or 30 years ago. Within the Civil engineering curriculum these An excerpt from issue #3 of California Surveyor, published January 1968 EDITOR'S NOTE: All past issues of California Surveyor are available on our website by clicking on the current issue's cover: www.californiasurveyors.org subjects have been added at the expense of surveying, but the civil engineers certainly have the right to decide what is proper training for their graduates.

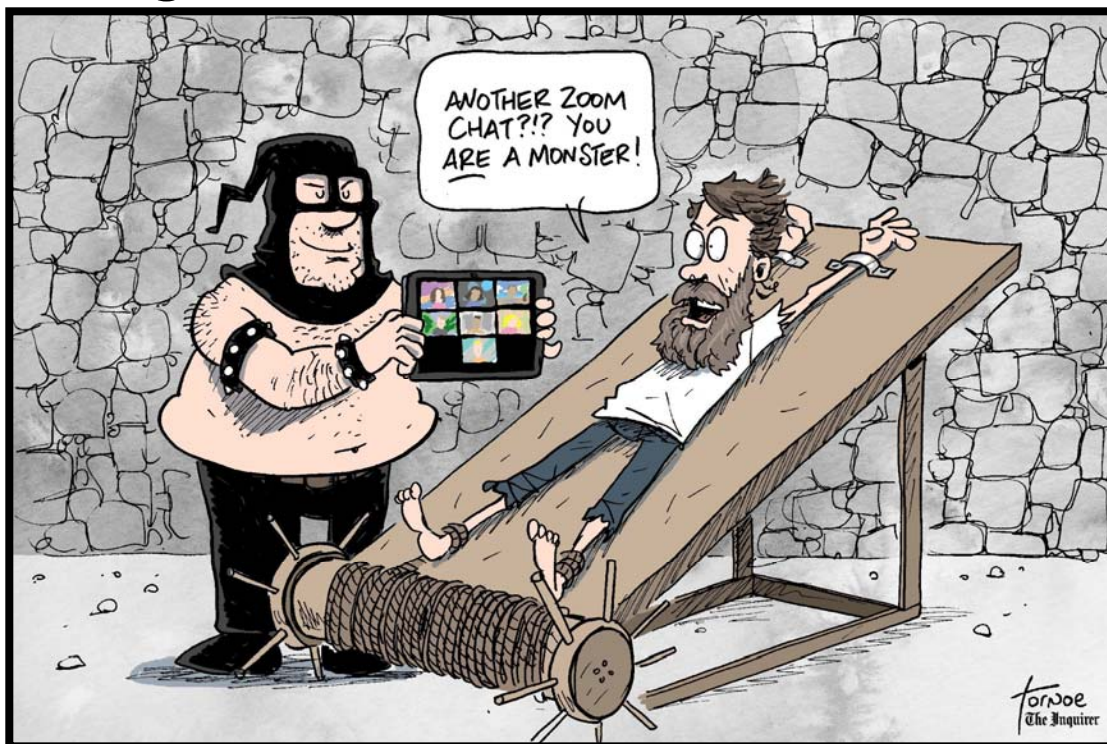
Any further attempt to build an adequate land surveying curriculum within or around a civil engineering program is futile. The many curriculums which have been proposed in the past were merely modified civil engineering programs and they are much too scientifically oriented. The futility of this approach is quite evident by their general lack of success.

The program that we need must be oriented towards the arts with an adequate scientific background to assure proficiency in boundary location, law, land planning and photogrammetry. The liberal education of the student must be stressed to enable him to fully appreciate and discharge his responsibility to society.

There is little student demand for a land surveying curriculum and there will not be until the profession enhances its own image and until all land surveying work is done only by the Licensed Land Surveyor.

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Just for Laughs



SANDIS IS HIRING!

SANDIS is hiring numerous employees throughout the Central Valley to staff our work with California High Speed Rail.

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ABOUT SANDIS

SANDIS has been in the engineering and surveying industry for over 50 years and has over 165 employees. We actively recruit well-rounded individuals whom are technically skilled, team oriented, honest, optimistic, energetic and communicative. Through structured internal and external training programs, we continuously invest in our people to ensure that skill proficiency remains at the forefront of technological and industry advancements.

BENEFITS

SANDIS employees enjoy numerous benefits including medical, vision, dental, 401k matching, health savings accounts (HSA), transportation benefits, and educational reimbursement. We do more than the benefits you see on paper though, this year employees were treated to motorcycle rides, a family trip to Great America, and multiple ski trips.



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Project Surveyor | 3+ Years of experience | Selma, CA

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CAD Technician | 3+ Years of experience | Selma, CA

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Field Chainmen | 2+ Years of experience | Selma, CA (multiple positions open)

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National News

Are Satellite-Based Correction Services the “Next Utility”?

By Robert L. Green, PS

GPS: The Original “Next Utility”

In the summer of 1978, I worked as a rodman/chainman for Boston Survey Consultant (now the BSC Group). My crew partnered with the engineering staff to conduct soil percolation tests for septic system design. At one point, our boss informed us he had just attended a meeting at our corporate office in Boston on the status of the GPS satellite constellation. Little was known about this technology as the first GPS satellite (NAVSTAR 1) had only been launched months earlier. He told us that within a few years you would be able to put a “magic black box” on the surface of the earth and obtain XYZ coordinates. As an 18-year-old kid, it was impossible for me to comprehend as we were in the process of locating the percolation test holes with a turn of the century K&E transit, a handheld magnifying glass to read the vernier, a Philly stadia rod for distance interpolation, and a machete for cutting line. As I reflect on this story, I realize how lucky I am to have witnessed all these measurement technology enhancements over the last four decades.

Entrepreneurs and innovators like Charlie Trimble, Javad Ashjaee and Dr. Benjamin Remondi (the father of GPS kinematic principals) capitalized on this technology. The cost for one GPS receiver when they hit the market in the late 1980s was about \$100,000. Three GPS receivers, software and state-of-the-art computers were needed since most of the survey applications required GPS static survey methodology, creating a half million-dollar investment on equipment alone and resulting in only a handful of companies adopting this emerging technology. But those who did became pioneers and industry leaders.

[Continued on Page 8](#)



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Classifieds

TRANSPORTATION SURVEYOR - (CALTRANS) DEPARTMENT OF TRANSPORTATION

Department of Transportation (District 10, San Joaquin County), is currently recruiting for multiple Transportation Surveyor positions (**\$5,406.00-\$10,377.00 per month**).

Some of the duties include, but are not limited to: Analyzes field survey data, prepares Survey Requests and compiles supporting information for field surveys. Produces maps and documents, including legal descriptions, acquisition deeds, appraisal maps

The incumbent works in an air-conditioned office setting with artificial lighting and/or natural lighting. Above duties require the use of a computer for extended periods of time. Duties may also require the incumbent to sit for extended periods of time to perform the duties of the position. Duties may also require the incumbent to work overtime. The incumbent may occasionally be required to work outdoors, on uneven terrain and in various weather conditions. The incumbent may also be required to travel overnight on short-term assignments throughout the Central Region or State for meetings, training or field/office job assignments.

San Joaquin County - Final filing Date: Until Filled

For further information, refer to the duty statement in the CalCareer link below.

<https://jobs.ca.gov/CalHrPublic/Jobs/JobPosting.aspx?JobControlId=248376>

JUNIOR ENGINEERING TECHNICIAN - (CALTRANS) DEPARTMENT OF TRANSPORTATION

The Junior Engineering Technician (JET) is an entry level position to get started in the Surveying profession (**\$2,661.00-\$4,026.00 per month**). This position is planned on being available in District 10 (San Joaquin County) in the near future. Go to <https://dot.ca.gov/programs/human-resources/exams/surveyvacancies> for more information and open positions.



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Know of an available job. Please submit the position information to:

editor@californiacentralvalleysurveyors.org

Are Satellite-Based Correction Services the “Next Utility”? *continued from page 6*

Game Changer #1—Real Time Kinematic (RTK)

On December 8, 1993, GPS Initial Operational Capability (IOC) was announced by a joint venture between the Department of Defense and the Department of Transportation. On April 27, 1995, GPS Full Operational Capability (FOC) was announced by the U.S. Air Force Space Command. This event reassured both public and private stakeholders of the validity of GPS. Real Time Kinematic systems started “trickling” into the profession.

My employer at that time was Mangini and Associates in Pueblo, Colo. Having worked for the progressive thinking BSC Group, I was versed enough in GPS technology to talk company management into buying an RTK system. I felt like a spaceman with my backpack, Trimble 4000 GPS receiver, GPS antenna, whip radio antenna, extension poles, heavy camcorder batteries and cables. Early RTK receiver technology suffered from limitations. The most notable was range or distance from base station to rover. Most manufacturers RTK systems specified positioning performance as $1 \text{ cm} + 1 \text{ ppm RMS HZ} \times 2 \text{ cm} + 2 \text{ ppm RMS VT}$. The parts per million (PPM) component plays an important role later in this article.

Game Changer #2—Real Time Networks (RTNs) and Virtual Reference Station (VRS) Technology

Around the year 2000, my company was a sub-consultant on a Colorado DOT project in Grand Junction, Colo. The CDOT Project Manager told us that Mesa County had several UHF broadcasting base stations in the area. Having used RTK since its infancy, I understood the language he gave, but the workflow was foreign to me. All my RTK experience involved utilizing my base station and my rover. How was I to trust a third-party source of correction data? After observing multiple project control points with my RTK rover via corrections from one of the local Mesa County stations, I was sold! These local stations became the foundation for the Mesa County Real Time Virtual Reference Network (RTVRN)—one of the longest operational VRNs in the country. As robust as GNSS network solutions have become with enhancements of correction data via internet protocol, they all have limitations. For one, they cover a specific geographic location that is typically geo-fenced—whether that be city, county, states or larger. Another limitation to RTN solutions is cellular coverage, no cell = no data! Yes, RTK “bridge” technology exists that incorporates cellular boosters that rebroadcast the internet-based correction via UHF. However, this requires another piece of hardware, cables, and in most cases, a designated ISP data account.

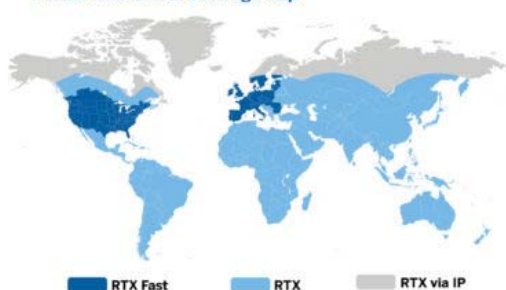


Illustration of RTN/VRS technology, a precursor to Trimble RTX.

Are Satellite Based Correction Services the “Next Utility” for the 21st Century?

On several occasions during the mid to late 1990s I had the opportunity to collaborate with GIS professionals on creating survey grade GIS databases and schemas. The consultants utilized Trimble MGIS/resource-grade backpack mounted receivers and antennas with a handheld data collector. I was told that these units were OmniSTAR compliant and could receive satellite corrections from this fee structured Satellite-based Augmentation System (SBAS). Upon arrival, I would setup my RTK system and get to work. The GIS team, on the other hand, would assemble their system and then wait for almost an hour to receive OmniSTAR “convergence.” Meanwhile, I had already collected a fair amount of RTK data. When we compared observed coordinate values, at best, they were within a meter or so of my centimeter RTK value.

Trimble RTX® Global Coverage Map



Now, fast forward to March of 2011 when Trimble Navigation acquired certain assets from OmniSTAR. This initiated a campaign of “disruptive innovation” not totally realized until May 5, 2020.

There exists a series of privately owned SBAS solutions from a variety of manufacturers (Novatel/TerraStar, EOS/Atlas, Trimble/RTX). Also, publicly available SBAS systems encompass the globe—WAAS (Wide Area Augmentation System), EGNOS (European Geostationary Navigation Overlay Service), GAGAN (GPS-aided GEO Augmented Navigation) and MSAS (MTSAT Satellite Augmentation

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Are Satellite-Based Correction Services the “Next Utility”? *continued from [page 8](#)*

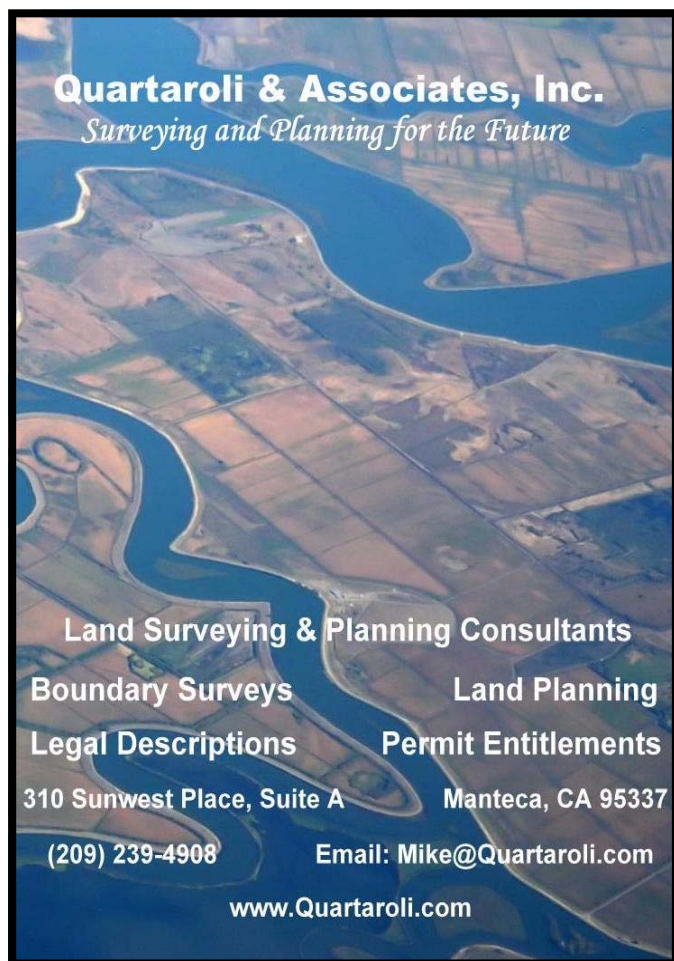
System). Although beneficial, these publicly available SBAS solutions yield 1-2-meter accuracies at best. Trimble CenterPoint RTX (Real Time Extended) yields 2 cm (RMS) horizontal and 5cm (RMS) vertical accurate solutions in less than 1 minute. Automated transformations from global ITRF (2014) current values to NAD 83 (2011) are now performed real time in Trimble Access (TA) 2020. Additional enhancements are included in the December 2020 release of TA 2020.20. Most notably is the inclusion of plate motion deformation models. See: white paper “Deformation Models in Trimble Access 2020.20 and Trimble Business Center 5.40” at

<https://frontierprecision.com/wp-content/uploads/Trimble-Def-Models.pdf>. In the U.S., (NAD83 2011) the Horizontal Time Dependent Positioning utility (HTDP v3.2.9) was incorporated. These new features resolve RTX to NAD83 (2011) legacy offset issues that required localization routines to remedy.

Briefly mentioned earlier in the article, on May 5, 2020, Trimble announced coast-to-coast coverage of CenterPoint RTX Fast service (less than 1 minute to convergence). All of this has happened since Q2 of 2020, which now makes RTX a “utility” that is much more than a game changer. Imagine being a large survey engineering firm with projects scattered around the U.S. or, for that matter, around the globe. All crews, regardless of location, could simultaneously work from the same correction source on the same geodetic datum with real time corrected data, all with the same accuracies! Mind blowing isn’t it? This is just the beginning of an avalanche of GNSS rendered enhancements I predict will happen over the next 5 years (or less)!

How does Trimble CenterPoint RTX work?

Trimble owns and operates a network of terrestrial tracking stations strategically placed around the globe. These stations receive data broadcast by all GNSS satellites (GPS, GLONASS, Galileo, BeiDou, QZSS) and are the basis for a precise global modeling campaign including GNSS satellite orbit, clock, and atmospheric errors. This data is then sent to the RTX control center and processed. The RTX control center transmits the processed data to two entities. One: IP/cellular. Two: the processed data is also up-linked to geostationary L-band satellites. The L-band satellite then broadcasts correction data to the end user in the field providing real-time cm level positioning without the need for a base station, UHF radio, VRS/RTN connection nor internet connectivity.



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Over the past decade, as Trimble’s network of tracking stations has densified, convergence/initialization times have been reduced dramatically. On May 5, 2020, the densification of these ground-based GNSS tracking stations was sufficient for Trimble to release RTX Fast service for the U.S. and parts of Southern Canada. RTX Fast service boasts less than 1 minute to converge at 2 cm (RMS) HZ. With that said, I independently tested these specifications utilizing Trimble’s R10 Model 2 GNSS receiver and TSC7, Trimble Access and no cellular connection or local base. The result of using this technology in different environments, in different states and at varying times of the day was eye opening. Trimble CenterPoint RTX converged in less than a minute and met specifications. However, for even better results, I wait on average 5-7 minutes to obtain precisions of 0.03’/1cm HZ (DRMS) x 0.08’/2.5cm VT (1sigma). I chose these settings since DRMS (not RMS as in the specifications) has been the defaulted precision display in both legacy Trimble Survey Controller and Trimble Access for almost 25 years. Access 2020 gives users the option to select the job precision displays of legacy DRMS, 1 Sigma, 95% or 99% reporting. This enhancement integrates Trimble Access settings with those in Trimble Business Center as DRMS has been added to Trimble Business Center as well.

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