



Trimble Business Center

Release Notes

Version 5.40

www.trimble.com

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Welcome to Trimble Business Center 5.40

Trimble Business Center (TBC) provides a complete office software solution for survey and construction professionals. Having the ability to work in a single software environment streamlines operational efficiency while minimizing the costs of data management, software maintenance and training.

New features

Following are the new features included in this version of Trimble Business Center. The features are organized by their related ribbon tabs. To view context-sensitive help at any time while using TBC, press F1.

Survey

- **IGS log-in** - The IGS Internet download service, available for selection in the Internet Download command pane, now requires a NASA Earthdata log-in to download precise orbit data and earth orientation parameters to be used for GNSS processing in TBC. A default Trimble public IGS log-in will be automatically applied when you select to use an IGS service. This ensures that you will have uninterrupted access to this service, and no changes are required on your part.

Note: If you have your own personal log-in you want to use, right-click any IGS service in the Internet Download pane, select Properties > Security, and enter your log-in credentials. Your single log-in will override the default Trimble public IGS log-in and apply to all IGS download services. To return to using the Trimble public IGS log-in, clear your log-in credentials in Properties > Security and click OK.

- **Support for new Trimble 360 Prism** - TBC fully supports total station data captured using the new Trimble 360 Prism.
- **CMRx Internet download** - You can now download CMRx message files containing RTX corrections from the Trimble RTX-PP server using the Internet Download command. The use of CMRx files, which contain ionospheric/tropospheric atmospheric models, enables the baseline processor, operating in "RTX mode", to compute more fixed solutions from shorter occupation durations.
- **Time-dependent transformation enhancement** - The time-dependent coordinate transformation feature in TBC, which is used to transform between ITRF 2014 at the epoch of measurement and the global reference frame, has been enhanced to use displacement models in the working area when available.

A displacement model is a model of the movement of points on the surface of the Earth due to plate motion, tectonic strain accumulation, seismic/post-seismic deformation, glacial isostatic adjustment, and/or other geological or anthropogenic processes that cause significant coordinate change over large areas. The model is used to propagate coordinates from one epoch (such as the epoch of measurement) to another (such as the reference epoch of the selected global reference datum). This ensures users obtain optimal accuracy in coordinate transformations and the best possible coordinates in the selected coordinate system.

Following is the current list of reference frames in which TBC and Trimble Access will be able to convert RTX positions with centimetre accuracy:

<i>Country</i>	<i>Reference frame</i>	<i>Displacement model</i>
Australia	GDA2020	None
Brazil	SIRGAS2000	VEMOS2009 2019-12-01
Canada	NAD83(CSRS)v7	CSRS Velocity Grid V7.0
Denmark	EUREF-DK94	NKG-RF03
Estonia	EST97	NKG-RF03
Finland	EUREF-FIN	NKG-RF03
France	RGF93v2	None
Germany	ETRS89-DR91(R16)	None
Iceland	ISN2016	ISN2016 2019-07-01
New Zealand	NZGD2000	NZGD2000 Deformation Model
Norway	EUREF89	NKG-RF03
Russia	PZ-90.11	None
Sweden	SWEREF99	NKG-RF03
UK	OSNetv2009	None
USA	NAD83(2011)	HTDP V3.2.9

The Project Settings dialog has been updated to include two new read-only fields in the Coordinate System Summary section: "Global reference datum" (the reference frame for global coordinates) and "Global reference epoch" (the reference epoch for global coordinates).

Note: Advanced users can check, or even update, time-dependent transformation parameters in the TimeDependentTransformationDatabase.xml file located in C:\ProgramData\Trimble\GeoData.

- **Coordinate System Database update** - The newest Coordinate System Database installed with TBC includes the following enhancements:
 - Added new geoid and zone for Faroe Islands.
 - Added new datums, geoid and zones for Fehmarnbelt Project in Denmark.
 - Fixed 90 GGF files to ensure "Description" in the GGF file matches "Geoid Name" in the database.
 - Added datum JGD2011 for Japan and corresponding zones.
 - Updated datum PZ-90.11 for Russia, with corresponding EPSG IDs.

- Added EGM2008 geoid extraction for Russia and use it by default with Russian zones.
- Added Slovenian Vertical System 2010 and use it with Slovene National Grid.

CAD

- **Measure feature codes when creating a point** - When creating a point in TBC, you now have the option to assign a feature definition code and, optionally, a control code to the point using the Measure Codes option in the Create Points command pane. This option allows you to select the feature definition/control group that includes the codes you want to work with, which are displayed on buttons in a customizable grid layout. You can then use your mouse, arrow keys, or keypad (3x3 grid only) to select the code from the grid to assign to the point. Or, you can specify the direction on the grid that you want subsequent code selections to be made for you automatically when you use the same feature definition/control code group to create multiple points, saving you the time it takes to select a code each time you create a point. In addition, you have the option to append the assigned code with a numeric suffix that identifies the instance of the code usage.

This workflow matches the workflow used in Trimble Access 2020 and provides a quick and easy way to iteratively add codes to new points.

You can import or export a Measure Codes Definition file (.mcd) that, when used in a project with its paired Feature Definition file (.fxl), specifies the layout and behaviour to be applied in the Measure Codes option, allowing you to easily share the same configuration across projects and applications.

- **Modify CAD objects with vertex grips** - When you pick a CAD object (line string, polyline, rectangle, polygon, circle, arc, text, or label) grips are now shown on all vertices, enabling you to edit any segment by moving its grips. Click-and-drag any vertex without picking a specific segment. Using the Shift or Control keys while dragging gives you additional controls, such as orthogonal movement.
- **Import various types of meshes in DGN/DWG file** - This data is imported as a 3D polyface mesh, 3D polygon mesh, or 3D solid. This enables you to import meshes from other applications like AutoCAD. You can also export tunnel meshes from TBC and re-import them.

Draughting

- **Create 'quick profiles' (cross-sections) in site-based projects** - Dynamically generate cross sections in site-based projects which you can then place in view or on sheets; this means you do not have to manually create such cross sections each time. These quick profiles are basically cross-sectional graphs of the cut/fill on a site. You can also edit and copy quick profiles to draughting templates to reuse or share with colleagues.

Surfaces

- **Set a duplicate point tolerance for imported surface data** - Specify whether points in the same relative location are duplicates based on the horizontal distance between them. Using this tolerance, duplicate points in some imported file formats are retained or removed in the resulting surfaces. This applies only to internal data in imported TTM, LandXML, and other types of "fixed" surfaces, which can affect how surface triangles are formed. Set this tolerance in Project Settings > Computations > Surface > Surface Creation Defaults.

Corridors

- **Prevent the automatic vertical connection between corridor material layers** - By default, in corridor template instructions, each material layer automatically connects directly up to any material layer above it in order to create a closed area for average end area volume calculations. The ends of segments (created by instructions) that do not connect to other segments in the same material layer are subject to the addition of these vertical segments. In some scenarios, this vertical connection is not necessary or creates isolated areas in the material layer. In these cases, you can now untick Vertical Auto-Connect box for any material layer.

Point clouds

- **Batch import point cloud files** - When you select to import multiple .e57, .las, or .laz point cloud files simultaneously via either drag-and-drop or the Import command pane, you can specify scaling properties in the Point Cloud Scale dialog that displays for the first file and select to apply the same properties (with the exception of Advanced settings) automatically to all of the subsequent files of the same type selected for the import, avoiding taking the time to respond to each import.
- **Extract line features from point clouds** - Use the Extract Line Features command to extract line strings from overhead utility lines or kerb and gutter features displayed in point clouds. Intuitive, interactive 3D controls make it easy to define scan point search parameters. And if TBC encounters a problem during the extraction process due to line feature irregularities or sparse scan points, you are provided a menu of clear options for determining how best to proceed. Before saving the extracted line strings, you can use the post-extraction QA/QC tools to verify and make changes to any of the lines as necessary (for example, ignore or mark the line, or apply smoothing options).
- **Extract classified interior point cloud regions** - The Extract Classified Point Cloud Regions command, which previously supported the extraction of exterior classified regions only, now supports the extraction of interior classified regions as well. Indoor classification types include Walls, Floor, Grated floor, and Ceiling. Extracted classified regions can be exported to other software packages that recognize the same classification standards.

- **Filter scan station points** - Use the Filter Scan Station Points command to select to view only the scan points located within a specified distance of the scan station that recorded them, making it easier than ever to view just the scan points with which you are interested in working.

Construction data

- **Upgrade from VisionLink to WorksOS** - Trimble VisionLink has been replaced by the new, improved Trimble WorksOS web app! Using WorksOS commands in TBC, you can continue to perform these former VisionLink functions:
 - Create a WorksOS project to send data to.
 - Publish your project's coordinate system, reference surfaces (design and surveyed/as-built) and alignments to WorksOS so you have data to compare your machine data against.
 - Overlay machine data onto a Plan View so that you can view, analyze, and filter the current data coming from one or more machines, for example: Pass count details or overlay Elevation overlay.
 - Modify overlays in various ways to see different machine data:
 - Select a new overlay type.
 - Filter by a different geographic area.
 - Select a specific machine or design.
 - Limit by a new date range.
 - Review machine data cell-by-cell by picking locations in a machine data overlay.
 - Create a surface from machine data (in the form of an elevation overlay).
 - Instruct the Machine Data Service to re-process mis-tagged files so that their design and lift and date range information is correct.
- **Add SiteVision Data to WorksManager/Siteworks Exports** - As a Trimble Site works user with SPS986, TSC7, and SiteVision for Windows, you can now export/publish SiteVision TRB files (with associated VCLs) from TBC to the Site works design folder. This allows SiteVision to read from the same folder without creating a new folder structure of its own (applies to both the Publish to WorksManager and Export to USB commands).

Photogrammetry

- **Import and process DJI aerial survey data** - Use the new Import DJI UAV Data command to import RTK aerial survey data collected by a DJI Phantom 4 RTK. Then process the data and create deliverables (point clouds, elevation rasters, and/or ortho-mosaics) in TBC, or pass the data through to UASMaster for processing.
- **UASMaster 10.x enhancements** - UASMaster 10.x, which is available to TBC users as a powerful alternative for processing, geo-referencing, geo-imaging, geo-capturing, and geo-modelling UAS data, has been enhanced as follows:

- Significant improvement in the quality of 3D textured meshes - This provides users more realistic 3D models in close range and UAV applications.
- Significant improvement in the performance of camera calibration - The number of iterations in calibration process has been reduced, resulting in increased productivity for challenging platforms.
- Approximate Terrain Height Look up for images in Project Editor - An integrated global height model allows users to define an approximate and individual terrain height for each image in the whole block, resulting in better initialization and data validation in project set-up, especially in areas with high undulation and challenging terrains.
- Smart detection of matching strategy for better performance in 3D reconstruction - Selecting the "Exhaustive" matching strategy option causes the software to attempt to match each image to all possible and available images in the block. Selecting the "AutoDetect" option in Pair-builder mode causes the software to include the neighbouring images, which are selected automatically based on GPS and IMU observations. This leads to efficient matching of large projects. The user can benefit from the "Contiguous" option as well, if the image IDs correspond to the acquisition order.
- Improved quality in point cloud and meshes - Due to the improvements in 3D reconstruction, the quality of final products (for example, point clouds and meshes) are considerably higher than the former versions. The point clouds are ready to be used in Trimble Clarity.

Tunnels

- **Import tunnel set outs from Trimble Access** - When assigning set outs to a tunnel, you can now import a CSV (.csv) text file containing set out information from Trimble Access. The imported set out information is displayed on the Set Outs sub-tab. This method reduces the time required to create set out points in TBC. The required format for the CSV file can be found at https://help.trimblegeospatial.com/TrimbleAccess/latest/en/Tunnels_SetoutMethods.htm.
- **Create a tunnel shape from a CAD object** - Use the Create Tunnel Shape from CAD command to create a tunnel shape from a CAD object (for example, a CAD line, rectangle, or circle) that you imported or created in your project. The tunnel shape defines tunnel cross section geometry that can be added to a tunnel template that, in turn, can be applied at any tunnel corridor chainage to define the shape of the tunnel at that chainage. If necessary, the tunnel shape can be edited in the Shape Editor to add to or modify its line-work. This command streamlines the process of creating a tunnel design in TBC when a CAD design file is available.

- **Select over break/under break tunnel points** - Use the Select Tunnel Points command to select assigned as-built tunnel points that exceed the over break/under break tolerance you specify. You can view the selected points in the Project Explorer and in the graphic views. You can also view the selected points in the Selection Explorer where you can use them to create an easily re-selectable selection set. Optionally, you can export the points using one of the many point export formats available.
- **Perform a tunnel inspection** - Use the Create Tunnel Inspection Map command to create a tunnel inspection map that allows you to compare the shapes of two tunnel meshes using the Tunnel Inspection View. You can select to compare a designed tunnel mesh to an as-built tunnel mesh (for example, compare the design mesh to an as-built excavation mesh). Or, you can select to compare an as-built tunnel mesh to another as-built tunnel mesh (for example, compare an as-built excavation mesh to an as-built shotcrete mesh). You can use the Create As-Built Tunnel Mesh command to create an as-built tunnel mesh from total station survey data or from a point cloud to use in the inspection map comparison.

Deviations between the two meshes are displayed in a planar view that shows the base mesh "unfolded", flattened, and over-laid with a grid of custom-sized mesh cells whose colours indicate the distance between each base mesh cell and its corresponding comparison mesh cell. Deviations are also displayed in a cross section view that includes delta lines that are colour-coded to indicate over breaks and under breaks, and in a deviation view that shows the deviation between the base mesh and comparison mesh at the specified chainage in a 2D graph. This is helpful in verifying tunnel shotcrete thickness and surface undulations

- **Create tunnel inspection points** - Use the Create Tunnel Inspection Points command to create over break/under break points from a tunnel inspection map that can be used in Trimble Access to peg out areas that are out of tolerance, such as for shotcrete or excavation quality control. Optionally, you can then export the points using one of the many point export formats available.
- **Run a Tunnel Inspection Report** - Run a customizable Microsoft® Word-based report based on a tunnel inspection map that compares the shape of two tunnel meshes to identify differences between them. The report contains information on the under break and over break areas and volumes for the entire specified tunnel inspection and at the specified chainage interval. This is useful for determining "hot spots" where there are discrepancies between the compared meshes, such as shotcrete and lining control. Depending on the tunnel inspection map you select, you can compare a designed tunnel mesh to an as-built tunnel mesh (for example, compare the design mesh to an as-built excavation mesh). Or, you can select to compare an as-built tunnel mesh to another as-built tunnel mesh (for example, compare an as-built excavation mesh to an as-built shotcrete mesh). Images and information used in the Tunnel Inspection Report comes directly from the Tunnel Inspection View.

- **Extract classified tunnel regions** - Use the Extract Classified Tunnel Regions command to automatically extract from a tunnel point cloud a Tunnel Shape classified region and, optionally, a Tunnel Bottom classified region. These new regions are selectable in the Project Explorer, View Filter Manager, and graphic views, and they are exportable to a different project or to other software packages that recognize the same classification standards.

Mobile Mapping

- **VS2010** - The Ladybug library has been upgraded to the latest version in order to remove the Microsoft Visual C++ 2010 dependencies.
- **Scanner calibration** - A more robust calibration is provided.
- **Enhancement of Image Quality for Left and Right Cameras** - Images are read from the MXIPS raw files. A new option enables you to equalize these images to obtain enhanced images with more details in dark areas when displaying or exporting them.
- **Miscellaneous enhancements to existing features** -
 - All run trajectories are by-default displayed in the Plan View after importing a mission database file (*.mxd). You can see the location of each run, and select that run from the Plan View.
 - Resolved misnaming between Run View and the other Camera Views.
 - Upgraded the icon theme.

Data prep

- **Apply a Crest/Sag Rule in vertical designs** - When creating vertical geometry from a line in a vertical design to an alignment/line string, you can use the new Crest/Sag Rule, rather than the VPI rule. The Crest/Sag rule gives you an alternate method for representing an exact elevation on a line (with the VPI Rule, it can be difficult to hit an exact line elevation because the property specifies a point of intersection (of tangents) and not the line itself).
- **Rebuild one or all vertical designs** - You can now rebuild either a single vertical design or all vertical designs at once from the Project Explorer. When you rebuild all designs, they are rebuilt in the order shown in the explorer. Vertical designs are in alphabetical order there, so you can control the building order of the vertical designs with the naming, which is significant when different vertical designs contain the same objects.

Take-Off

- **Generate an Earthworks Summary report** - Create a quick, simple earthworks report in a familiar Microsoft® Excel format. The Earthworks Summary contains just the take-off estimation data you need to analyze and calculate a final construction bid. Compared to the full Take-Off Report, this summary calculates faster and provides more concise results that are easy to understand.
- **Apply a Fill factor in a Take-Off Report** - You can now apply a factor to a material volume Fill value displayed in a Take-Off Report.

Monitoring

- **Monitor point movement** - Use the new set of TBC Monitoring module commands to supplement manual/campaign-based monitoring projects by comparing coordinates for points that have been measured in the field multiple times over a period of time to track point movement (for example, to monitor earth or structure movement). Import GNSS, total station, or level data into TBC for each epoch where it can be timestamped, processed, and adjusted as necessary. The data is then uploaded to a monitoring project in the Trimble Connect cloud (Trimble Identification sign-in is required) where it is synchronized with previously uploaded epoch data (if available) to determine point displacement from epoch to epoch. This reduces the complexity of managing monitoring data on your local computer.

You can view point coordinate displacement values and user-specified warning/alarm threshold values for each monitoring point in the point's Properties pane. Or, you can view these values for all monitoring points in the Monitoring Points Spreadsheet. Threshold values alert you when the point has moved significantly since the previous epoch. You can view a displacement chart for each individual monitoring point that displays actual and extrapolated displacement values along a scrollable timeline. The chart provides a simple visual tool for determining trends in a single point's movement in its separate components - elevation, eastings, northings, 2D, and 3D. And, you can run a report that contains complete displacement information using tables, charts, and scatter plots for the entire monitoring project. Spreadsheets, charts, and reports can all be printed to a paper printer or a PDF file that can be easily shared with others.

Support

- **New licensed modules** - Two new licensed modules are available in this release:
 - **Monitoring** - This module connects your campaign-based monitoring data from Trimble T4D into TBC like never before. It requires the Survey Intermediate edition or higher. For a complete list of features included with this module, see "Monitor point movement" earlier in this section.
 - **ANZ Toolbox** - This module is available worldwide, but it is driven by local requirements in Australia and New Zealand. It requires the Survey Intermediate edition or higher. For a complete list of features included with this module, see "ANZ Toolbox" later in this section.

- **Subscription licensing** - TBC now supports a subscription licence option along with the hardware and software perpetual licence options. There are six subscription edition offerings available: four for core survey and construction workflows and two for speciality applications:
 - Site + Field - For data prep, survey processing, surface, alignment, and corridor workflows.
 - Survey + Mapping - For complete survey, scanning, and mapping workflows.
 - Construction - for complete data prep, survey, take-off, mass haul and advanced corridor workflows.
 - Enterprise - For all core surveying and vertical surveying and construction workflows mentioned in the above offerings, including aerial surveying and tunnelling
 - Aerial Survey - For UAV processing and survey deliverables.
 - Mobile Mapping - For mobile mapping customers focused on MX9 processing and deliverables.

There are also three subscription modules available:

- ANZ Toolbox - Available worldwide, but driven by local requirements in Australia and New Zealand, this module can be added to any of the core editions. Functionality includes interfacing with 12D and regionally-specific export formats.
- Japan i-Construction - Available in Japan only, this module can be added to any of the core editions and supports digital construction workflows and local requirements in Japan.
- Crack Detection - Available in Japan only, this module can be added to any of the core editions and features optical workflows to identify structural and pavement cracks with Nikon's optical total and image chainages.

These offerings can be mixed and matched on an annual basis, require a free Trimble Identity (TID), and can be checked out for detached usage. For more information, see your local Trimble Distribution Partner or visit trimble.com/tbc.

Multi-national organizations and single-shop operations alike will benefit from the new on-line Trimble License Manager (<https://license-manager.trimble.com/>) to assign, create, and modify users by the Trimble Identity account associated with their email. Licence administrators can also create customized reports to track usage and assure that their TBC Subscription is right for them.

Note: If you are an Aerial Survey subscription licence user who wishes to use UASMaster, you must set the Aerial Survey subscription as "Active" in TBC's License Manager before using the licensed features of UASMaster.

- **Build your knowledge with a TBC eLearning program** - Open the TBC page on Learn.Trimble.com to enrol in consolidated learning plans or workflow-oriented courses. You can watch, read, and practice with comprehensive training materials to earn TBC certificates.
The Trimble Learn portal also gives you access to hundreds of other courses ranging from civil engineering and construction to geo-spatial industries and more, with how-to lessons on everything from cost estimating to 3D scanning.

Third-party tools

UPG and SITECH Construction Systems are actively helping to improve Trimble Business Center (TBC) for users in Australia and New Zealand. As part of this, they are continually developing commands and enhancements for the Australasian market which can be installed as extensions to (TBC).

These commands are licensed to the ANZ Toolbox Module, except the 12da Import/Export (Basic) which is licensed to the Viewer.

- **Pavement Conformance Report (Advanced)** - The Pavement Conformance Report (Advanced) command is a pavement conformance reporting tool that supports measuring vertical, perpendicular, cross-fall, pavement thickness, and edge data. There are various options for summary display and an option to visualize output in Plan View prior to creating the report.
- **String Conformance Report** - The String Conformance Report command is for reporting as-built strings against a design strings such as curb/kerb, barrier, and walls. There are options for summary display and an option to visualize output in Plan View prior to creating the report.
- **Map Objects** - The Map Objects command enables you to create a mapping rule set by selecting a group of objects using all or part of an object name (using the wildcard asterisk "*") and applying the same layer, colour, line style and/or name to those objects simultaneously. In addition, you can import mapping rule sets into your project, or export the ones you create, using *.layermap files.
- **Find and Replace Points** - The Find and Replace Points command enables you to Search for and rename points by Point ID or Feature Code.
- **Rename/Regroup Layers** – The Rename/Regroup Layers command lets you select layers and add a prefix and/or suffix to the layer names and group them if required.
- **Rename Objects** - The Rename Objects command lets you select any objects and add a prefix and/or suffix to the object's name.
- **Measure Surface** - The Measure Surface command allows you to measure a distance between two surfaces or between a position on a line and a surface dynamically and displays elevations live in view. You can click and record measurements that are copied to the text box and sent to an excel report. Option to measure either vertically or perpendicular to the surface from a line.

- **Show Line Direction Options** - The Show Line Direction Options command shows a visual indication (Plan and 3D View) of the direction of any lines that are selected. It does not require a command to be open to operate. The command is used to turn on/off, set colour, and size of direction arrows.
- **Move Line** - The Move Line command enables you to select a line and move left or right a small amount without needing to copy and offset.
- **Surface Area Report Tool** - The Surface Area Report Tool command enables you to select a surface and boundary or multiple boundaries to calculate Plan and Surface Areas. It displays the shaded boundaries and areas on screen and can then write the text to a user defined layer and to an excel report.
- **Convert to CAD Points** - The Convert to CAD Points command enables you to select points and convert them to CAD points. It will attach user data to CAD points such as point id, feature code, and descriptions. This enables you to change data that you do not need global positioning on into lightweight CAD points.
- **Insert Vertices From Points** - The Insert Vertices From Points command enables you to select a line and some points, to create new vertices (and optionally points) from points, on the line perpendicular to the selected points.
- **Export Scans E57** - The Export Scans E57 command enables you to export a region of a point cloud to E57 format with each scan station going into a separate file.
- **ADAC Settings V5.01** – Use the ADAC Setting pane to enter appropriate header attributes for your project, the ADAC Setting pane is brought up with any header data already entered for the current project.
- **Set Sewerage Connection Attributes** - Use the Set Sewerage Connection Attributes to automatically calculate the distances required to be measured between a house connection and the sewer pipes and the cadastral boundaries.
- **Explode Corridor Mass Haul** - The Explode Corridor Mass Haul command converts corridor mass ordinates into CAD objects (line strings).
- **12d Import/Export Support**
 - The 12da Import/Export (Basic) can handle strings/points/surfaces and alignments for 12d.
 - The 12da Import/Export (Advanced) can import advanced 12d data including, Pipe super strings, Drainage type strings, 12d Trimesh objects, hatch fills, and attributes. It can now also import a color.4d file from 12d and apply those colours to files subsequently imported to a TBC project.
 - 12dxml import/export is no longer supported.

For help on each of these features, visit <https://tbcanz.com/anz-toolbox/>.

Feature Definition Manager

- **Feature Definition Manager support for indexed feature codes** - The Feature Definition Manager (FDM) application supports indexed feature codes contained in code groups included in an FXL file imported from Trimble Access. Indexing allows users in the field, for example, to easily append an assigned code with a numeric suffix that identifies the instance of the code usage. When the imported group is displayed in FDM, all indexes that were assigned in Trimble Access are removed from the codes. (In the past, codes that had been manually indexed were not displayed in code groups in FDM.)

Resolved issues

The following major issues **have been fixed** in this version of TBC:

- When using the Track Region Outline command, areas were not being computed.
- Registering a large number of points on import (for example, from a CSV file) was very slow.
- When running the Publish Field Data command and going over multiple designs, there wasn't an option to select multiple designs using Ctrl + Shift or Select All.
- An out-of-bounds error occurred when using the Local Site Settings command and adding a northings, eastings, elevation for the Texas North Central coordinate system.
- When editing a line string, line string markings were staying visible in Plan View after closing the Edit Line string command.
- Check GCPs were not being transferred to the TBC UAS processor.
- TBC's point IDs for GCPs did not match the point IDs reported in the Adjustment Report.
- Miscellaneous point cloud regions were created with point cloud deliverables.
- Coordinates of GPS points in the Hungary coordinate system were "shifting" inexplicably.

Known issues

See "Known Issues" in the TBC Help for a complete list of known issues associated with the software and related utilities, along with possible workarounds.

Miscellaneous notes

- **TBC floating tool panes "disappear"** - If you are running TBC using two monitors at different resolutions and you move a TBC floating tool pane (for example, Layer Manager) from one monitor to another, it is possible for the pane to "disappear" (that is, it no longer displays on either monitor even if you close all other open windows). When this occurs, you can re-display the pane by holding the Shift key and clicking the associated command icon in the TBC ribbon.
- **Windows 7 is no longer supported** - On 14 January 2020, Microsoft officially ended its support for the Windows 7 desktop operating system, which could leave computers vulnerable to cyber attacks or dangerous software bugs. In accordance, TBC v5.21 and later is not supported on computers running the Windows 7 operating system.
- **Ignore unknown satellites in baseline processing** - If an "unknown" satellite (that is, a satellite that is not listed in Project Settings > Baseline Processing > Satellites) is imported into a project from raw data files, TBC automatically sets the satellite's baseline processing status to "ignore" so it is not included in the processing (just as if you had unchecked it in Project Settings had it appeared there).
- **New prism height measurement method for Trimble SX10** - Prior to TBC v5.20, typical measurement methods for Trimble prisms designed for traversing with S-series total stations included "True vertical", "Bottom notch", "Bottom of V10", "Lever of V10 extension", etc. For TBC v5.20, the prism measurement method "Bottom notch" has been renamed "S notch" (same as the prior "Bottom notch"), and a new "SX notch" measurement method has been added that provides the same horizontal and vertical offsets as the bottom notch on the SX10. Other prism measurement methods have not been changed.
- **Mobile Mapping Windows display** - When processing Mobile Mapping data, it is recommended that your Window's display scale and layout do not exceed 100%.
- **Disabling a laptop integrated graphics card** - If you are using a laptop computer with both an integrated (on-board) graphics card (for example, Intel®) and a discrete graphics card (for example, NVIDIA®) enabled, TBC may freeze when you are working with point clouds. To avoid this problem, you must select to disable the integrated graphics card and use only the discrete graphics card when working with scan registration. Follow these steps:
 - a. Open your Windows Control Panel, select BitLocker Drive Encryption, and select to suspend protection - if it is turned on. This is required to make the BIOS change required to disable the integrated graphics card.
 - b. Restart your laptop computer and select to enter the BIOS set-up utility as soon as the first image displays (prior to Windows launching) by pressing the appropriate short cut key (for example, F1, F2, F10, ESC, or DEL). The BIOS short cut is typically displayed briefly on the screen during start-up.

- c. Once in the BIOS set-up utility, navigate to the location of the graphics card control and use the appropriate method to disable the integrated graphics card. The method for doing this will vary depending on the BIOS set-up utility. You can search the Internet for specific instructions.

For example, for a Dell® laptop implementing NVidia Optimus™ technology, you would select Settings > Video > Switchable Graphics in the BIOS set-up utility, and then untick the Enable Switchable Graphics check box.

- d. Save changes and exit the BIOS set-up utility to continue computer start-up.
- e. If BitLocker Drive Encryption was suspended, turn it back on.

Additional notes:

- Your laptop computer consumes more power when using the discrete graphics card exclusively. If it is running in battery mode, you should re-enable the integrated graphic card when you are done working with scan registration.
- Do not use Device Manager to disable the integrated graphics card. Device Manager disables the card just for Windows, not for the entire motherboard, causing the integrated graphics card to still load first.
- Some laptops do not allow you to disable the integrated graphics card.
- **ArcGIS versions and Windows operating systems** - When using TBC to connect or write data to an ArcGIS Enterprise Geo-database provider, see your ArcGIS user documentation to determine which versions of the ArcGIS products are supported on the various versions of the Windows operating system.
- **OpenCL Runtime driver** - OpenCL Runtime is a graphics accelerator driver required when TBC is performing automatic tie point matching or dense point cloud creation. If the driver is not installed, an error message is displayed indicating OpenCL Runtime cannot be found. In this case, you must download OpenCL Runtime from <https://software.intel.com/en-us/articles/opencl-drivers#phiwin> and install it on your computer using the instructions provided.
- **VCE compatibility** - You cannot open a VCE project file created with this new version of TBC in an older version of TBC.
- **Windows 8 users** – Some components in TBC require Microsoft .NET Framework 3.5 to operate. If the .NET Framework 3.5 is not installed, you are prompted to install it when you install TBC. If your computer is connected to a domain that does not allow you to directly connect to Windows Updates on the Internet to enable and install .NET 3.5, you may need to change your group policy settings. See your system administrator for assistance.

For more information, see <http://technet.microsoft.com/en-us/library/dn482065.aspx>

- **TabletSync transfers** - If you use TabletSync to transfer large files (for example, panoramas) into TBC, it can take a long time for the upload to complete. As an alternative, you can shorten the transfer time by copying the files from the tablet onto a USB memory stick and copying the files from the stick into TBC.

- **Proxy server settings** - If you receive an error when trying to access an external server to process data, you may need to specify a proxy server for your LAN using Internet Properties > Connections > LAN settings > Proxy Server.

System requirements

Operating system:	Microsoft Windows® 10 (64-bit version) Microsoft Windows 8 (64-bit version) Note: Starting with TBC v5.21, Microsoft Windows 7 is no longer supported.
Processor:	Dual-core 1.80 GHz or better recommended Quad-core 2.80 GHz or better (additional cores with hyper-threading support highly recommended for Aerial Photogrammetry, Mobile Mapping, and Scanning modules) Important! Because components of TBC make use of Intel-only multi-thread processing, AMD Ryzen processors are not supported.
Random access memory (RAM):	4 GB or more recommended 32 GB or more recommended for Aerial Photogrammetry, Mobile Mapping, and Scanning modules
Hard disc space available:	10 GB or more recommended 100 GB or more on solid-state drive required for Aerial Photogrammetry, Mobile Mapping, and Scanning modules The recommended SSD overall hard drive capacity is 500 GB or more for Aerial Photogrammetry, Mobile Mapping, and Scanning modules
Monitor:	1280 x 1024 or higher resolution with 256 or more colours (at 96 DPI)
I/O Ports:	USB 2.0 port required if HASP hardware key is used

Graphics:

DirectX 11 compatible graphics card with 512 MB memory or more

OpenGL version 3.2 or later required when working with point cloud data (latest version recommended)

8 GB graphics card or higher (for example, NVIDIA Quadro P4000) required when working with Aerial Photogrammetry, Mobile Mapping, and Scanning modules

Note: If you are using a laptop computer with both an integrated (on-board) graphics card and a discrete NVIDIA graphics card enabled via Optimus technology, your computer must allow you to select to disable the integrated graphics card and use only the discrete graphics card when working with point cloud data. See "Disabling a laptop integrated graphics card" in the "Miscellaneous notes" section earlier in this document.

Important!

It is critical that you keep your graphics driver(s) updated if you are working with point cloud data.

Whether your computer has one or multiple graphics cards installed, you must ensure each has been updated with the latest driver provided by the card's manufacturer. The best way to determine if your driver needs to be updated and, if so, perform the update is to visit the card manufacturer's website. For more information, see "Update and Configure Your Graphics/Video Driver" in the on-line Help.

(If, instead, you decide to update your driver using the Windows Device Manager and the "Search automatically" option, the program may suggest using a Microsoft-approved WHQL version of the driver. However, to ensure you have the latest bug fixes and new features for your graphics card, it is recommended that you use the latest manufacturer version instead.)