Trimble Business Center

Release Notes

Version 5.50

www.trimble.com

Welcome to Trimble Business Center 5.50

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

- **Import as-staked polyline points from Trimble Access** - In support of the polyline stakeout feature in Trimble Access, TBC now allows you to import from the field software as-staked points for polyline geometry, enabling you to check deltas compared to design polylines. This is in addition to the existing support for the following types of as-staked points: normal points, line points, alignment points, surface points, corridor points, and catch points.
- **Spectra Geospatial Origin field software support** - TBC fully supports the import and export of survey data collected using Spectra Geospatial's newest field software: Origin. Origin is a full-featured, Android and Windows-supporting, modern software built to meet the needs of survey professionals, and it is intended as an upgrade/replacement for Spectra Geospatial Survey Pro.
- **Share time-dependent transformation parameters with Trimble Access** - The JXL importer and exporter in TBC have been updated to include time-dependent transformation data to ensure transformation is performed using the same parameters in both TBC and Trimble Access, regardless of the version of the Coordinate System Database being used with each.
- **Global reference datum and epoch for a datum transformation** - The Coordinate System Manager has been enhanced to display the global reference datum and epoch used as the origin for a datum transformation. When creating a custom datum, you will be able to select the global datum and epoch in the list of reference datum supported by the Trimble Geodetic Library. In TBC, the datum and epoch selected for the current coordinate system are displayed in the Coordinate System group in Project Settings.
- **Updates to Coordinate System and Time-Dependent Transformation databases** -

  The newest Coordinate System Database installed with TBC includes the following enhancements:

- Updated geoid model for Guyane.
- Added legacy geoid models HT2_1997, HT2_2002v70 and HT2_2010v70 for Canada.
- Fixed Hungarian geoid Vitel14.
- Added Nova Scotia zones 4 & 5 for Canada (Atlantic).
- Added new geoid RAF18v2 for France.
- Added datum and zone PSD93 / UTM N057E used in Oman.
- Added new zones and geoid model for Senegal.
- Added new geoid model 2020 for Lithuania
- Fixed WKT parsing of EPSG:28992. "RD_New" should resolve to zone 4800 = "RD 2018".
- Added new zone CABA 2019 for Buenos Aires, Argentina.
- Updated ITRF realizations to ensure they are used at epoch of measurement.
- Improved RTX in Belgium using correct global reference datum.
- Improved RTX in Switzerland using correct global reference datum.
- Improved RTX in Poland using correct global reference datum.

The newest Time-Dependent Transformation Database installed with TBC, which is used to transform between ITRF 2014 at the epoch of measurement and the global reference frame, includes the following enhancements:

- Checked and updated <DataSource> for time-dependent transformation parameters.
- Added support for SnakeGrid for V4 file and ASA parameters.
- Added grid transformations from GDA2020 to GDA94.
- Added displacement model for KGD2002 in Korea.
- Added displacement model for JGD2011 in Japan.
- Improved local displacement model for New Zealand.
- Added support for new datum RGF93v2b in France.
- Renamed ETRF2000(R05) to ETRF2000.
- Added transformations parameters between ITRF2014 and NAD83(2011/MA11/PA11).
- Added support for datum LKS-92 used in Latvia.
- Added support for EUREF-NKG-2003 used in Lithuania.
- Added support for ETRF2000 (EPOCH:2010.5 and 2017.5) used in the Netherlands.
- Added support for CA SRS epoch 2017.50 (NAD83) used in California.

- Added support for KSA-GRF17 used in Saudi Arabia.
- Fixed SIRGAS-CON and SIRGAS1995, which were not working.
- Added ETRS89-DREF91 at epoch 2000 for legacy software.
- Fixed Canadian displacement model CSRS Velocity Grid V7.0 to be usable at any epoch.
- Improved transformation between ITRF2014 and ITRF1988.
- Improved transformation between ITRF2014 and ETRS89.

- **Enhanced Trimble Sync** - The Trimble Sync command, which allows you to share and synchronize data between TBC and Trimble Access via Trimble Sync Manager and Trimble Connect, has been enhanced to enable the sharing of the following types of data:
  - Text - Save selected text objects, along with their specified size and style, to a DXF file to be shared with Trimble Access, where they are displayed in the same size, style, and location as was specified in TBC.
  - Corridor surfaces - Save selected corridor surfaces, along with their associated corridor alignment data, to a LandXML file to be shared with Trimble Access.
  - Tunnel designs - Save selected tunnel designs, along with their associated tunnel alignment data, to a TXL tunnel file to be shared with Trimble Access.

  This is in addition to the already supported sharing of point and linework data.
- **Disable redundant backsight observations from Trimble Access** - After importing Trimble Access MTA data that includes disabled foresight observations, the associated redundant backsights, which are imported as enabled, are included in the Import Summary Report and the Flags pane alerting you to the fact that you may want to disable them, which you can do easily and efficiently with one click of the new Disable Redundant Backsights command. When a redundant backsight is disabled, the corresponding station point is updated accordingly when you recompute the project.

GIS

- **New ArcGIS connection component** - ArcGIS users can use the GIS Connection Manager command to connect to a file geodatabase, and enterprise geodatabase to download schemas and upload features using the new and updated ArcGIS provider.

CAD

- **Include interior regions in tracked outlines** - Use the Merge Holes to Boundary option to include inside linework (e.g., islands) in resulting geometry when using the Track Region Outline command.

- **Create and edit dependent points** - Create CAD points with coordinates derived from dependencies on other objects. A dependent point can be based on a station, percentage along a line, intersection, or another point. If any of the source geometry changes, the dependent point is updated accordingly. Similarly, if you create lines that rely on a dependent point, those lines will update any time one of the points is changed.
- **Enhanced IFC support** - IFC (Industry Foundation Classes) is a commonly used schema for Building Information Modeling (BIM) data. The hierarchy of the schema used to define an IFC 3D model can include a large number of objects, each representing a physical architectural component. IFC support in TBC has been enhanced as follows.
  - Import and export Trimble TrimBim (TRB/.trb) files containing BIM/IFC data that can display varying types of geometry in the graphic views, including meshes and linework.
  - View the IFC hierarchy of BIM objects nested beneath the BIM Data parent node in the Project Explorer. And, view read-only BIM entity properties.
  - Export all or some of the BIM entities in your project in a single TRB (.trb) file. (This allows you to export entities from multiple IFC projects that have been imported into your TBC project in a single export file.)
- **Import lines, polylines, and arcs from Trimble Access** - In support of the line creation features in Trimble Access, TBC now allows you to import lines, polylines, and arcs that were drawn (keyed in) in Trimble Access and are contained in a JobXML file (.jxl) as editable linestrings displayed in graphic views in your TBC project.
- **Layer Group and Selection Set added to Properties pane -** The Properties pane for common CAD objects (for example, points, lines, text, blocks, and dimensions) has been enhanced as follows:
  - A Layer Group field has been added that allows you to view or change the layer group to which an object's layer is assigned. (This field displays only if you have defined layer groups in your project.)
  - A Selection Set field has been added that allows you to view, change, or create a selection set to which an object is assigned (previously available only in points Properties).
- **Easily select groups of associated objects** - When selecting objects in a graphic view, you can now press the Ctrl key when you make your first object pick and all of the objects contained in the same group as the picked object (for example, sheets, labels, side slopes, and so on) will be selected.
- **Multiple grip selection option** - The Display pane in the Options dialog now includes an option to display grips for a selected CAD line segment and for a specified number of adjacent line segments, enabling you to display just the number of grips with which you want to work. This ensures you are in control of how many grips are displayed when you select a segment.

- **CAD Leader lines** - If a CAD leader line is not associated with a text label (for example, the associated label text was exploded), you can associate it with any text label using the new "Source text" field in the CAD Leader Properties pane.

Surfaces

- **Create a surface offset from another surface** - Create a new surface based on an offset from another surface. This command simply makes a copy of an existing surface and shifts it up or down on the Z-axis. You can also leave the delta elevation at 0.00 to make a copy of the surface in place, such as for historical topography comparisons over time.
- **Combine multiple surfaces** - Make a single surface from two or more separate, non-contiguous surfaces that do not overlap. In the new combined surface, no triangles are formed between the separate parts (the previously independent surfaces).
- **Explode a surface** - Break a surface into its component linestrings and CAD points. The linestrings are attached to the CAD points by reference, so if you move one of the points, all the lines connected to it will move. If desired, you can also choose to explode a surface just where the slope changes beyond a specified vertical angle tolerance.
- **3D Drive View enhancements** - The 3D Drive View has been enhanced as follows:
  - Drive across one of two selected surfaces to identify cuts and fills. For example, you can drive across a final graded surface to identify cuts and fills related to the initial ungraded surface at precise coordinates.
  - If you change the zoom level or view direction while driving along an alignment or across a surface, click the new Reset button at any time to reset the default zoom level and default straight-ahead view.
  - Use the Project Settings to select from a predefined list of vehicle, instrument, and people icons (Sketchup models) to display in the view, or create your own and easily import it into your project.
  - As an alternative to the first-person from-vehicle view, use the Project Settings to select a third-person view from behind the vehicle at varying distances and heights as necessary to optimized the perspective.
  - Select a line or alignment along which the vehicle will self-drive.
  - Use your Arrow keys to conveniently turn the vehicle when driving across a surface.

Corridors

- **Apply advanced tilt properties to roundabouts** - Use these two new roundabout tilt methods for intersection and cul-de-sac roundabouts:

- **Automatic tilt all circles** - The outer circle defines the circular plane by finding the roundabouts intersection points with leg alignments; this sets the tilting values of slope and direction. The inner circle and inner shoulder are parallel with the plane defined by the outer circle. You also can specify these properties for offsetting two inner lines: Vertical offset inner shoulder and Vertical offset inner circle. These properties are used to move both of these inner lines up/down.
- **User-defined tilt all circles** - Specify the tilt (slope and direction) of both the inner and outer circles manually. Optionally, you can specify the vertical offset between the inner and outer circles. The lane and inner shoulder slopes are calculated automatically.

- **Enhanced corridor export options** - The export options available on the Corridor tab in the Export command have been enhanced with name changes that are more descriptive of the individual exporters, making choosing the right corridor exporter easier and more intuitive.

Point clouds

- **Extract cross-sections from a point cloud** - Use the new Extract Cross-Sections from a Point Cloud command to extract open or closed 3D cross-section line segments from a point cloud based on any of the following:
  - Two scan points - Select start and end scan points to create a line and extract a single cross-section along the line (for example, creating a contour line along a stockpile).
  - Reference lines - Select one or more linear objects (such as linestrings or CAD lines) to extract one or more cross-sections along the lines (for example, extracting underground mine profiles along predefined drilling/excavation reference lines).
  - An alignment - Select an alignment or other linear object (such as a linestring) and specify the intervals and offsets to use to extract one or more cross-sections perpendicular to the alignment or line (for example, extracting cross-sections along an alignment of a scanned roadway).
- **Define complex profiles for curb and gutter line extraction** - The Extract Line Feature command, which allows you to create linestrings from curb and gutter features displayed in a point cloud, has been enhanced to allow you to select up to ten nodes (four was the previous limit) to define more complex feature profiles for line extraction, such as road barriers, and curb and gutter with sidewalks.
- **Auto-select overhead utility lines for line extraction** - The Extract Line Feature command, which allows you to create linestrings from overhead utility line features displayed in a point cloud, has been enhanced to auto-select lines that are parallel and adjacent to a selected line within the distance you specify. This can be very helpful if you are extracting many lines as might be the case, for example, with large power towers.

- **Export Trimble X7 data to Trimble TMX** - Use the new X7 to TMX exporter to export Trimble X7 laser scanner data to the Trimble TMX-2050 Display System, which features a large high-definition touch screen with sharp visuals and a choice of FmX® Plus or Precision-IQ™ display applications to suit your specific farm practices.

Construction data

- **Remove dependent data from field-bound VCL designs** - When exchanging data between TBC projects using VCL export/import, 'intelligent' dependencies (and the dependent objects) are retained. This can lead to unnecessary data and larger file sizes on field devices. Therefore, now when sending data from TBC to field systems (Siteworks and Earthworks) as designs via WorksManager, dependent objects for surfaces and road surfaces (e.g., the points and lines that define them) are not included. Typically, those objects are not needed for field work and eliminating them makes VCL files much smaller and more usable by the field devices and machine controllers.

  This behavior is controlled by the Cleanup VCL file property in TBC. By default, this property is set to Yes for WorksManager projects.

Photogrammetry

- **Support for GNSS quality data from DJI aerial photo stations** - If RTK is used when recording DJI aerial photo images, TBC extracts the RTK quality information from the imported metadata for each image, enabling an absolute orientation adjustment to be performed without the need to process baselines or measure ground control points. Although the use of GCPs and baseline processing are still recommended if adequate data is provided, this enhancement is very useful in cases where no GCPs are provided and either no T02 file was included or the Internet Download for the region or time frame does not offer data to run baseline processing.
- **Aerial photo processing enhancement** - Aerial photo processing in TBC has been enhanced to provide faster adjustment and processing with more accurate results, and provide wider support for the various UAS/UAV products available.
- **DJI Phantom 4 UAV support** - TBC now supports the import and processing of aerial photo data collected with a non-RTK DJI Phantom 4 UAV equipped with a 20MP model FC6310 camera, as is included with the Phantom 4 Pro and Phantom 4 Advanced.
- **DJI Zenmuse P1 UAV support** - Use the Import DJI UAV Data command to import aerial survey data collected by the new DJI Zenmuse P1 UAV. Then, use a GCP-based workflow (GNSS post-processing is not yet supported) to adjust the data and create deliverables (point clouds, elevation rasters, and/or orthomosaics) in TBC, or pass the data through to UASMaster for processing. Designed for photogrammetry flight missions, the Zenmuse P1 integrates a full-frame sensor with interchangeable fixed-focus lenses on a 3-axis stabilized gimbal.

- **ECW compressed aerial images support** - You can now import georeferenced ECW (Enhanced Compression Wavelet) aerial image files with embedded map projection information to use as background images in TBC. ECW technology provides exceptional compression, capable of reducing very large files to five percent of their original size, while retaining the image's full visual quality. Because of the small file size provided by the ECW format, files can easily be stored, transferred, and displayed, even on small devices. ECW-formatted images are supported in all TBC graphic views, including dynaviews and plotboxes, and can be used as a background map. Use the Options command to specify whether to copy ECW files into the project folder on import, or reference them at their current location.
- **Create orthomosaic with transparent background** - The Create Orthomosaic command, which is used to create an orthomosaic photo image from imported aerial survey data that can be exported to other software packages for display or additional processing, now provides an option to specify that orthomosaic background pixels (pixels not covered by any of the ortho images) be rendered transparent.
- **Radiometric corrections applied to aerial photo images** - TBC applies radiometric corrections to aerial photo images automatically during the photo station adjustment process to improve the interpretability and quality of the images. The corrections compensate for over- or under-lit areas within images (due to image exposure, focal length, the sun's azimuth/elevation, and atmospheric conditions), resulting in images that are more evenly lit, and in which fine detail is more easily discernible. The radiometric corrections, which are applied very quickly during the adjustment process (minimal impact on processing time), are contained in small RDX (.rdx) files stored in your project folder (one for each photo image).

Tunnels

- **Monitor tunnel convergence points** - Use the new Assign Tunnel Convergence Points command along with the Trimble Monitoring Cloud service to monitor tunnel convergence points by storing and comparing coordinates for tunnel points that have been measured in the field on multiple occasions over a period of time and imported into TBC where they are processed and adjusted as necessary. The cumulative data tracks movement over time resulting from tunnel deformation, which can be viewed in graphic and tabular views using the Convergence Points tab in the Tunnel View or in the customizable Tunnel Convergence Report. Displacements generated by this analysis are reported relative to the tunnel design alignment in terms of station, offset, and elevation.
- **Specify label interval in Tunnel Inspection Cross-Section View** - Use Project Settings to specify the distance interval at which labels are displayed in the Tunnel Inspection Cross-Section View. This setting is useful when you want to maintain a high level of density in the Inspection Plan View while still being able to view readable labels in the Cross-Section View.

- **View as-built points in the Tunnel View** - Use the Tunnel View command to quickly view a graphical and tabular comparison between assigned as-built points and a tunnel design to determine overbreak and underbreak information for construction verification and quality control, similar to the information displayed in the Tunnel As-Built Report.

Monitoring

- **Point monitoring enhancements** - The point monitoring feature in TBC has been enhanced as follows:
  - After selecting points to monitor, the automatic synchronization process begins immediately (no need to first run the Sync Monitoring command as before). This eliminates the need for an additional command when adding new epochs to a monitoring project.
  - You can select any monitoring point in the Project Explorer and select to delete it from the current epoch or from all epochs. This provides additional flexibility for managing monitoring projects in TBC.

Mobile Mapping

- **Enhancement of the Target Picker in the Intersected Plane** - You can define a rectangular pattern by picking three consecutive and connected vertices.

Data prep

- **Apply a Virtual Break rule to a line in a vertical design** - Use the Virtual Break rule to split a line into sections without actually breaking it (such as would be done by the Break Line command). The Virtual Break rule helps you work more efficiently when have to edit short sections of a long line. Sometimes a line must be divided into pieces to isolate the area that will be computed, without needing to actually break the line into smaller lines.

Support

- **Licensing updates** - To better align features with targeted workflows and customer needs, the following licensing changes have been made for this release of TBC:
  - A new entry-level TBC Starter subscription edition has been added for GNSS, total station, and digital level-based workflows as well as basic machine and field data file preparations.
  - The Sample Point Cloud Region and Sample Region by Intensity commands are now included with the Surface Modeling Edition perpetual license and available in all subscription license editions except the new entry-level TBC Starter.

  For more information, visit the Trimble Business Center website at https://geospatial.trimble.com/products-and-solutions/trimble-business-center, or contact your local dealer at http://dealerlocator.trimble.com/.

Third-party tools

- **New ANZ Toolbox commands** - These commands have been added to the toolbox:
  - **Convert to Horizontal Linestring** - The Convert to Horizontal Linestring command allows the user to convert linestrings containing vertical tab data to horizontal data only, by linearizing curves using a chord to arc tolerance.
  - **Convert to Multiline Text** - The Convert to Multiline Text command allows the user to convert CAD text to CAD Multiline text within TBC.
  - **Insert Alignment Table** - The Insert Alignment Table command allows the user to insert a customizable table that describes the horizontal or vertical geometry that was used to create the alignment.
  - **Insert Excel Table** - The Insert Excel Table command enables you to insert a table from an excel spreadsheet in csv format and customize the display settings that are visible in the graphic plan view.
  - **Adjust Polyline with Bowditch** - The Adjust Polyline with Bowditch command allows the user to adjust a 2d polyline/linestring using a Bowditch adjustment.
  - **Line Node Cleanup** - The Line Node Cleanup command allows the user to clean up duplicate nodes on a linestring and adjust any vertical segments.

Resolved issues

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

- The JXL exporter exported grid coordinates to meters when US Survey Feet was selected.
- Exported DC files were not using the project N/E setting.
- No message was displayed indicating exported RXL's do not support arcs defined by the chord length.
- The ReferenceGlobalFrameID was lost in the CSM 3.9.1 Export to JXL.
- When opening a v5.32 project in v5.40, the coordinate system did not update when reselecting the coordinate system.
- For some datasets, the Beidou B3 frequency was not used for processing when it should have been.
- An error occurred when creating a corridor mass haul with no template data.
- Scans were sometimes importing into the wrong location due to transformation errors.
- You could not import a DAT file with a DiNi negative rod height measurement.
- An error occurred when trying to clear entries in the Convert CSV to FXL command.
- An Office Sync error sometimes occurred when trying to sync data to devices in the field.

- The EPSG ID remained the same regardless of which unit you exported.
- As-Drilled Hole data was missing from the Drill Hole Quality report.
- When importing a drill plan and corresponding as-built drill plans, only the drill plan should have appeared in the Drill Hole Quality report' command.
- TBC sometimes froze or performed poorly when you right-clicked in the Import command.
- An error occurred when using Works Manager to write to USB.
- When using the Create Points at Intervals command, arc/circle center points could not be created.
- The Sharable Side Slope Table option was incorrectly included in the Create Surface Tie command.
- If you selected to display grips on a line with many segments, a grip would display on each segment node possibly causing performance issues and unnecessary clutter in the graphic view. (For a description of the enhancement that resolves this issue, see "Multiple grip selection option" in the "New features" section earlier in this document.)

Miscellaneous notes

- **Alienware Command Center** - If you are running TBC on a Dell Alienware gaming computer, the Alienware Command Center application can interfere with some user interface controls in TBC. It is recommended that you disable Alienware Command Center when running TBC to avoid any problems.
- **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 no longer supported** - On January 14, 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 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 setup utility as soon as the first image displays (prior to Windows launching) by pressing the appropriate shortcut key (for example, F1, F2, F10, ESC, or DEL). The BIOS shortcut is typically displayed briefly on the screen during startup.

  c. Once in the BIOS setup 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 setup 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 setup utility, and then uncheck the Enable Switchable Graphics check box.

  d. Save changes and exit the BIOS setup utility to continue computer startup.

  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 Geodatabase 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** - As a general rule, you cannot open a VCE project file created in a newer 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 disk 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 500GB or more for Aerial Photogrammetry, Mobile Mapping, and Scanning modules
Monitor:	1280 x 1024 or higher resolution with 256 or more colors (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 discreet 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 online 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.)