

Release Notes

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Welcome to Survey Office

Survey Office (SO) provides a complete office software solution for survey 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.

Important Note! This version of Survey Office is available to:

- Perpetual license users whose current warranty expiration date is **May 1, 2024** or later. (If your perpetual license warranty expires prior to this date and you proceed with the installation, licensed features will not be available.)
- Subscription license users whose subscription is currently active.

If necessary, you can contact your distributor to purchase a warranty extension or renew your subscription. In the SO ribbon, select Support > License Manager to view your warranty or subscription expiration date.

New features

Following are the new features and enhancements included in this version of Survey Office. To view context-sensitive help in SO while using any of the commands mentioned here, simply press **F1**.

Corridors and Alignments

- **New International Roughness Index (IRI) Report** - As a Mobile Mapping or Terrestrial Scanning user, run the International Roughness Index (IRI) Report command to get enhanced IRI deliverables that can simplify your workflow. Based on point cloud data, this road surface roughness report can be generated without the extra steps of creating corridors or manually draping wheel path lines on a surface. The report includes left and right lane scores (along with other results) that can be exported to Trimble AgileAssets and as a Microsoft Excel sheet. Different from the previously released Roughness Report, this report is designed for:
 - **Simplified analysis process** - The report can now compute IRI as soon as scans are generated in a TBC project. These changes simplify and speed up the IRI analysis process. Scans should be based on either:
 - an aggregate metric evaluated by measuring the longitudinal profile of road pavement, generally along a wheel path or
 - the average of wheel paths in both directions.

- **More usable results** - Problem areas that need to be examined are now highlighted so you can address IRI values that do not pass your specified threshold. This connection between reported values and the data used to generate them means you no longer have to look at station values in the report and then find that starting station in your alignment to identify problem areas. The report creates linestrings that are colored similar to RMS values of the mobile mapping trajectory. The default Microsoft® Excel output can be easily imported into other software, such as AgileAssets Pavement Express. You can also select created CAD linework and export it in a desired format using standard exporters in TBC.

Coordinate System

- **Coordinate System Database (CSD) enhancements** - Since the release of SO v5.90, the default Coordinate System Database (current.csd) installed with the application has been enhanced as follows:
 - Added NAD27 datum and zones for the city of Toronto (as predefined records)
 - Added EPSG Alias 2056 for CH 1903+ (LV 95)
 - Added Datum and Zone for Lyon Turin Project
 - Added alternative zones and EPSG aliases for Finland
 - Added ISO ID 979 for Kinematic Datum IGS20
 - Time-dependent transformation for South Africa
 - Updated Geoid Model for Romania
 - Updated Displacement Model for Japan
 - Fixed Swiss Geoid 2004 HTRANS
 - Added LDP Zones for Ohio DOT
 - Updated Datum Grid and Geoid Model for Austria
 - Added EPSG codes for NZGD2000 projected coordinate systems
 - Support S-JTSK / Krovak East North
 - Added Geoid Model GCG2016 for Germany
- CSD Database v108:
 - Modernized support for Philippines
 - Updated US State Plane Zone Extents
 - Updated Japanese State Plane Zone Extents
 - Modernized support for Tanzania with datum TAREF11 and geoid EGM2008
 - Added new geoids ROvT4.08 for Romania and Bucharest
 - Added support for Guatemala

- Added support for Wisconsin Transverse Mercator
- Added new geoid model RAC23 for Corsica
- Added new geoid DVR90 2023 for Denmark
- Added new ITRF2020 plate motion model
- Corrected wrong missing values in AusGeoid2020 Geoid

Note the following:

- The geoid AUSGeoid2020(Australia) using the legacy file ausgeoid2020.ggf is now "hidden" for backward compatibility with old projects and jobs.
- Although it is hidden for use with new projects, this geoid remains in the library and will be used as necessary when opening an old project or file to which it is assigned.
- Geoid AUSGeoid2020(Australia)-fix was added using the file ausgeoid2020-fix.ggf, referenced as the default geoid model in all Australian Zones using this model.
- The new geoid AUSGeoid2020(Australia)-fix provides the exact same results as the old geoid AUSGeoid2020(Australia) in all areas where the user does not get any error message. It also fixes inappropriate error messages that some users might have encountered in specific areas.

CSD Database v109:

- Updated six ellipsoids, removing insignificant digits in the semi-minor axis. (This may generate warnings during the database upgrade process; however, there will be no impact on final coordinates.)
- Updated predefined zones for Slovakia
- Fixed RTX with Lambert county zones in Minnesota and old county zones in Wisconsin
- Refined zones for Deutsche Bahn
- Added support for all realizations used in California
- Improved extents for SVY21 Zone and ZoneGroup
- Added latest geoid model FIN2023N00 for Finland
- **Trimble Geodetic Library enhancements** - The Trimble Geodetic Library used in SO has been enhanced as follows:
 - Discrepancies in the grid point scale factor (k) computed in SO as compared to what is computed by NGS were resolved.
 - Map projection convergence calculations now match NGS answers.
 - A bug was resolved wherein time-dependent transformations could provide incorrect results for non-English locales.

- **Import coordinate system parameters in Coordinate System Manager** - The Coordinate System Manager (CSM) now provides the option to add user-defined coordinate systems to your coordinate system database (CSD) using imported JXL (.jxl) or WKT (.txt) files that contain the coordinate system parameters you want to apply. This enables you to more quickly add multiple user-defined coordinate systems and eliminates manual entry errors. All imported parameters can be reviewed in CSM before saving.

Network Adjustment

- **Include subnetworks in a network adjustment** - The Adjust Network command now allows you to perform a least-squares network adjustment that includes two or more subnetworks (networks with unconnected observations) within your project. You can specify adjustment parameters for each subnetwork individually as necessary before all subnetworks are adjusted together. An individual adjustment report is generated for each subnetwork.

GIS

- **Exchange GIS elliptical arcs and cubic bezier curves** - SO now supports the GIS exchange, import/export, and display of elliptical arcs and cubic Bezier curves used to display graphic features in SO. (Note: To correctly write features with elliptical arcs back to the data source from SO, a projected coordinate system is required in both the SO project and the data source.)
- **Preview GIS feature geometry** - Preview the geometry used to display features queried from a GIS data source prior to import to determine whether the query parameters specified in the Read Features from GIS command pane are correct, and, if not, make corrections before proceeding. This enhanced workflow lets you work more efficiently and with more precision when importing GIS feature geometry.
- **Update GIS feature geometry and attributes** - Feature geometry and attributes already imported into your project from a GIS data source are automatically updated when you re-import data from the same GIS data source, eliminating the need for the process to re-import the entire data set and greatly streamlining the feature geometry update workflow.
- **Exchange composite geometry and curves with a GIS data source** - When exchanging data with a GIS data source using the Read Features from GIS command or the Write Features to GIS command, you can now include composite geometry and curved lines. Composite geometry combines simpler geometric objects, such as lines and/or polygons, into a single multipart geometric object used to represent complex spatial features, including objects with "holes" through them, such as bridges and archways. (See also "Create composite geometry" later in these *Release Notes*.)
- **New selection options when reading features from a GIS data source** - When using the Read Features from GIS command, you can now select to filter the features downloaded into your project using the following options:

- Include only those features whose attributes match one or more specified values (for example, download only features whose "material" attribute is equal to "concrete"). This gives you even more control in determining which data you want to download and work with.
- Include only those features contained within an existing polygon or a temporary polygon you create just for filtering purposes. This provides more flexibility and speed when selecting a subset of features to download and work with in SO.
- **Exchange alignments with a GIS data source** - When using the Read Features from GIS command, in addition to selecting a polyline, you can now optionally select an alignment as a feature type for linework. The alignment can then be edited in SO if necessary and uploaded back to the GIS data source with the *Alignment* feature type assigned using the Write Features to GIS command. Optionally, you can select any existing alignment in your project, assign a feature code to it and process feature codes, and then upload the new alignment feature to the GIS data source.
- **Exchange data with SQL Server Service** - The GIS Connection Manager in SO now allows you to select a SQL Server Service data source type, in addition to all of the other source types available from which to choose. SQL Server Service provides queuing and reliable messaging for SQL Server, allowing you to easily access spatial database tables stored on the server. Simply select the authentication method (Windows or SQL Server), select the SQL database, and select the tables containing geometry data fields to which you want to connect.
- **Saved Esri service connections** - When you establish a connection to an Esri service provider using the GIS Connection Manager command, your selection (URL and, if applicable client ID and return URL) is stored in SO so that the next time you need to connect to the same provider, you can simply select it from a drop-down list in the Select GIS Data Source dialog. This saves you time and eliminates the need to keep the connection information available.
- **Support for ArcGIS Pro 3.x** - You can now access your enterprise geodatabase using SO with the latest version of ArcGIS Pro 3.x installed. After upgrading, you can continue to work with existing SO projects the same as before.
- **Export feature definitions and schema to a geodatabase** - The Geodatabase XML exporter has been enhanced to enable you to export your project's feature library schema and data differently. Three new options have been added:
 - Export all feature definitions - Select to export all feature definitions, including those definitions that do not include attached data.
 - Export standard tables - Select to export standard tables and definitions for polygons and polylines.
 - Export schema only - Select to export the feature library schema only, without attached data.

CAD

- **Streamlined IFC structure** - SO has implemented a more intuitive and streamlined method for organizing and managing BIM objects in IFC (Industrial Foundation Class) models. Now, when you select a BIM object in your project made up of individual geometry objects (CAD and IFC mesh objects), the individual member objects are selected as well, but they are no longer displayed in the Project Explorer individually and can no longer be selected individually in the graphic views. This greatly reduces the number of objects with which you might need to interact and eliminates the chance of accidentally moving them away from the model. It is also more aligned with how Trimble Access and Trimble Connect manage BIM objects.

Note: When opening a project created in an earlier version of SO in which the member objects have been moved, be sure to select to reset the anomalous data when prompted. This will ensure your project is in sync with the latest schema. (To open the prompt at any time to resync your data, press F12 and enter the command name: UpdateBIMDataCmd).

- **Align text with a line** - In the Properties pane, you can now set a Text Along property to Yes for a text object and then select a line (including arc segments) to align the text with. When you move the line, the text moves with it.
- **Enhanced color display for BIM objects** - The BIM Object Properties pane has been enhanced to allow you to optionally change the original colors applied to imported IFC linework and meshes for viewing in the Plan View and 3D View in SO. These enhancements make it easier than ever to highlight specific BIM objects as necessary to meet your specific needs.
- **Create composite geometry** - The new Create Composite Geometry command enables you to combine simpler geometric objects, such as lines and/or polygons, into a single multipart geometric object used to represent complex spatial features, including objects with "holes" through them, such as bridges and archways. Note that when exchanging data with a GIS data source using the Read Features from GIS command or the Write Features to GIS command, you can specify to include composite geometry. (See also "Exchange composite geometry and curves with a GIS data source" earlier in these *Release Notes*.)

Data Exchange

- **Download files from the new UNAVCO services** - SO has been updated to support the download of reference station data for baseline processing from the newly revised UNAVCO services, which now requires a user login for each 8 hours of use.
- **Import polylines based on points from Trimble Access** - Import from a Trimble Access job file (.jxl) polylines that dynamically change positions based on any changes to the coordinates for the underlying points.

- **Enhanced Connected Workspace** - The Connected Workspace command now provides full, seamless round-trip data synchronization between SO and Trimble Access—or other project team members running SO (using their Trimble ID login credentials)—via the Trimble Connect cloud platform, ensuring a smooth, safe, and efficient workflow when exchanging all types of project data.

Connected Workspace enables you to create Workspace projects into which Job data can be uploaded from Trimble Access, stored in the project, and imported into your SO project at any time. In addition, multiple project-related file types can be uploaded and stored in your Connected Workspace project and then, as necessary, either imported into your SO project or downloaded to another location.

- **Export Track files** - Export alignments and other linear entities in your project to a Track (.track) file that can be imported into Trimble GEDO rail track measurement system software.
- **Cubic panoramas exported with complete pixel data** - Cubic panoramas, such as those imported from Trimble X-series 3D laser scanners, are now exported from SO with a fixed size instead of being sized dynamically as is done with spherical panoramas. This ensures cubic panoramas are exported to their full extent.

Survey and COGO

- **Support for Trimble Access "measure-to-surface" points** - You can now import and process points recorded in Trimble Access using the Measure to Surface command, which simply measures the difference in distance from one or more points to a specified surface. This enables you to, for example, easily compare topo shots to an original ground surface model, or measure the clearance from the top of a tunnel to the road surface. If necessary, measure-to-surface points can be easily converted into survey points in your project.
- **Enhanced background maps** - The background maps provided by Trimble Maps Services displayed in this version of SO match those currently displayed in Trimble Access and are of higher quality and accuracy than background maps displayed in earlier versions. And, displaying them is easier than ever with the addition of the new Trimble Maps command in the Home > View ribbon.

Photogrammetry

- **True orthophotos** - Create true orthophotos that provide impressive sharpness and consistency with the following enhancements:
 - Cleaner edges with high resilience against noise
 - More consistent colors and a calmer appearance
 - Automatic handling of challenging input data
 - Higher resource efficiency and reduced node disk space requirements by up to 60%

- **More efficient resource usage** - Experience reduced disk space and better resource usage when working with photogrammetry projects. Large projects are faster to set up due to reduced data import and image preparation time. Disk space is reduced for true orthophoto single-node projects up to 20%.

- **Aerial image processing enhancement** - The processing of drone imagery using the Photogrammetry module has been greatly enhanced to support complex projects, particularly those with non-nadir imagery. This enables the processing of inspection and 3D projects, such as bridges and steep open-cast mines, creating true 3D point clouds and meshes. And to help simplify your aerial photogrammetry work, the Flight Mission Adjustment report has been redesigned to make it easier to read and understand.

- **Streamlined photogrammetry deliverables workflows** - The Create Deliverables command in the Photogrammetry module, which is used to create point clouds, elevation rasters, orthomosaics, and/or 3D meshes from aerial survey data, has been redesigned to enable you to select one of two workflow options that automatically change the layout of the command pane and the controls displayed based on the type of deliverables you want to create:
 - Mapping - This layout enables you to create either a 2.5D point cloud, true orthomosaic, and/or 2.5D mesh for a digital surface model (DSM), or a DTM point cloud, elevation raster, and/or DTM orthomosaic for a digital terrain model (DTM), all of which can be used for a variety of aerial mapping needs.
 - 3D Modeling - This layout enables you to create a 3D point cloud and/or a 3D mesh* that can be used for aerial inspection work. (*See "Create 3D mesh photogrammetry deliverables" later in these *Release Notes*.)

Having two specialized workflows is like having two commands in one, enabling you to focus on and create just the point cloud deliverables you need quickly and easily without navigating through unnecessary controls and parameter settings.

- **Create 3D mesh photogrammetry deliverables** - When creating photogrammetry deliverables using the Create Deliverables command with the Digital Surface Model elevation type selected, you now have the option to generate a 3D mesh from the model in a variety of formats that can be exported and viewed in other applications. A 3D mesh is the structural build of a 3D model consisting of polygons and surface faces.

- **Enhanced 3D visualization of aerial imagery** - You can now view images and wire frame cones of images/cameras in the 3D view, improving the orientation and visual impression of aerial photo data. This is especially helpful when working with 3D aerial inspections.

- **UAS support** - While the Photogrammetry module has been designed to support the importing and processing of UAS data from all drones with frame-based cameras, support for the following drones was specifically verified for this release in cooperation with the drone vendors and/or with Trimble resellers officially supporting these drones:

- Skydio
- Wingtra RGB61
- Autel XL705

Surfaces

- **Composite surface calculation improvements:**
 - Surface holes are now supported when creating the composite surface.
 - Edges between contributing surfaces are no longer offset (unless required to prevent a vertical wall); this reduces the number of surface flags that are generated.
 - Surface triangulation has been improved (with extra edge breaklines) so that the source surfaces connect properly in the composite surface's cross-sectional views. Surface vertices are actually reduced because there are fewer overlapping breaklines.

Point Clouds

- **Advanced point cloud filtering** - Use the new Advanced Point Cloud Filtering command to filter a point cloud by creating a new region based on the detected point elevations within rectangular sampling cells of a specified size applied across the point cloud. This can be helpful, for example, when trying to create a separate point cloud region for bare ground that does not include low-lying grass and other vegetation, but instead includes only the lowest points in the cloud, at ground level. Optionally, apply the advanced filter to a subset of points in the selected point cloud by specifying a polyline along with horizontal/vertical offsets to shorten processing time and generate more focused, cleaner output.
- **Customize point cloud classification** - Use the new Training tab in the Extract Classified Point Cloud Regions command pane to create custom point cloud classification models you can use to automatically extract new point cloud regions and/or adjust existing automatically extracted point cloud regions to your specific data. You do this by providing manually corrected/classified region examples (for example, fire hydrants or electrical boxes) to train and validate the model yourself using deep-learning technology, resulting in an output model with the highest quality possible based on your input sample data.
- **Export point cloud inspection with heat map or true color** - The Scan Inspection command enables you to graphically display positioning deviations between multiple point cloud regions (or mesh and surface objects and a point cloud region) by applying a differential color map ("heat map"). Now, when you export a point cloud in E57, LAS, or LAZ format to which an inspection heat map has been applied, you can select to export the point cloud with the heat map colors or true color so it can be viewed appropriately when imported into another project. This is a helpful feature for anyone who collaborates with others when working with inspections, as-built designs, monitoring, and/or tunneling.

- **Enhanced Drape Objects on a Point Cloud command** - The Drape Objects on a Point Cloud command, which has been available to vertically elevate each of the vertices defining a CAD line, alignment, or trajectory to a point or group of points in a point cloud, has been enhanced as follows:
 - In addition to lines, you can now select to elevate one or more CAD points to the point cloud using all of the available search strategies.
 - Apply a specified horizontal offset to CAD linear objects during the elevation process.
 - Select to automatically create points for CAD linear objects when the interval between nodes on the polyline exceeds a specified distance.
 - Select to elevate GNSS and Mobile Mapping trajectories.
- **Extract railway features** - The Extract Classified Point Cloud Regions command has been enhanced to extract rails, sleepers, and ballast railway feature classes from a point cloud: Rail and sleepers extraction is performed using 3D deep-learning models. Ballast extraction is based on the algorithmic approach and is performed on the downsampled point cloud between specified offset distances from the rail or trajectory. A trajectory or linestring can optionally be used to (1) improve performance by limiting the extraction search area, and (2) to have more control over ballast extraction.
- **Enhanced classification of aerial point clouds** - The Extract Classified Point Cloud Regions command has been enhanced to employ 3D deep learning models to more accurately extract an expanded list of classified regions from a point cloud created from aerial photogrammetry and/or Lidar data.
- **Dynamic cell sizing when filtering point clouds** - The Advanced Point Cloud Filtering command now provides a "smart sampling" option that automatically applies a dynamic cell size as necessary to account for fast elevation changes in your point cloud. The default cell size you specify for filtering (one point per cell) is dynamically decreased as necessary to include more points on inclines, helping to ensure data precision.

Tunnels

- **Industry-standard color scheme for tunnel inspection maps** - Tunnel inspection maps displayed in the Tunnel Inspection View now use a more industry-standard default color scheme to display delta values. This reduces time for the manual creation of color schemes when preparing tunnel construction quality control reports. You can easily change the color mapping scheme if necessary.

- **Reverse stationing direction in tunnel reports** - When creating a Tunnel As-Built Report, you now have the option to enter a start station greater than the end station to reverse the stationing direction to run from the end station to the start station. The viewing direction and offsets in the report are reversed, resulting in positive offsets to the left and negative offsets to the right. This is a great benefit when, for example, a tunnel is being constructed from the end station to the start station (for example, construction is proceeding from station 2+500 towards station 1+000).
- **Tunnel Undulation Report** - The new *Tunnel Undulation Report* enables you to use point cloud or total station data to measure the evenness/smoothness of an as-built tunnel mesh to, for example, analyze a shotcrete surface before the membrane system for waterproofing is applied. This is done as a quality check to identify out-of-tolerance areas requiring attention. Simply select the as-built mesh, specify the maximum bar length to be used for measurements, and specify the waviness tolerance that, if exceeded when measuring the deepest point from the bar, will cause the measured area to be flagged and included in the report.
- **Create vertical shaft tunnels** - The new Create Vertical Shaft Tunnel command enables you to create a vertical shaft tunnel using the same familiar tunnel creation and editing tools currently used to create "horizontal" tunnels, and following a similar workflow. Vertical shafts are common in tunnel and underground mining construction to allow construction or extraction to be started at lower depths.
- **Extract classified tunnel point cloud regions** - The Extract Classified Tunnel Regions command has been enhanced to now support two methods for extracting classified tunnel point cloud regions:
 - Basic - Select this method to perform a basic extraction of the tunnel's shape and bottom into new classified point cloud regions. This is optimal for TBMs (circular) and inspection of existing tunnels.
 - Advanced - Select this new method to use deep-learning models to perform a more precise extraction of the tunnel's shape and numerous tunnel features into new classified point cloud regions. The features extracted include rockbolts, shotcrete and rock surface, ground, and rebar mesh. This is optimal for conventional excavation, drill/blast construction, and mined tunnels.

Important notes and known issues

See the SO Help for a complete, up-to-date list of important notes and known issues related to SO.

System requirements

**Microsoft
operating system:**

Windows® 10 (64-bit version)

Windows 11 (64-bit version)

Processor:	<p>Dual-core 1.80 GHz or better recommended</p> <p>Quad-core 2.80 GHz or better (additional cores with hyper-threading support highly recommended for Aerial Photogrammetry, Mobile Mapping, and Scanning modules)</p> <p>Important! Because components of SO make use of Intel-only multi-thread processing, AMD Ryzen processors are not supported.</p>
Random access memory (RAM):	<p>4 GB or more recommended</p> <p>32 GB or more recommended for Aerial Photogrammetry, Mobile Mapping, and Scanning modules</p>
Hard disk space available:	<p>30 GB or more recommended</p> <p>100 GB or more on solid-state drive required for Aerial Photogrammetry, Mobile Mapping, and Scanning modules</p> <p>The recommended SSD overall hard drive capacity is 500GB or more for Aerial Photogrammetry, Mobile Mapping, and Scanning modules</p>
Monitor:	<p>1280 x 1024 or higher resolution with 256 or more colors (at 96 DPI)</p>
I/O Ports:	<p>USB 2.0 port required if HASP hardware key is used</p>

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

Note: 6 GB or higher NVIDIA graphics card with CUDA compute capability (5.0 or higher) required when working with point cloud classification.

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 "Important Notes" topic in the SO Help.

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.)