TILOS Guide
Getting Started with BIM in TILOS

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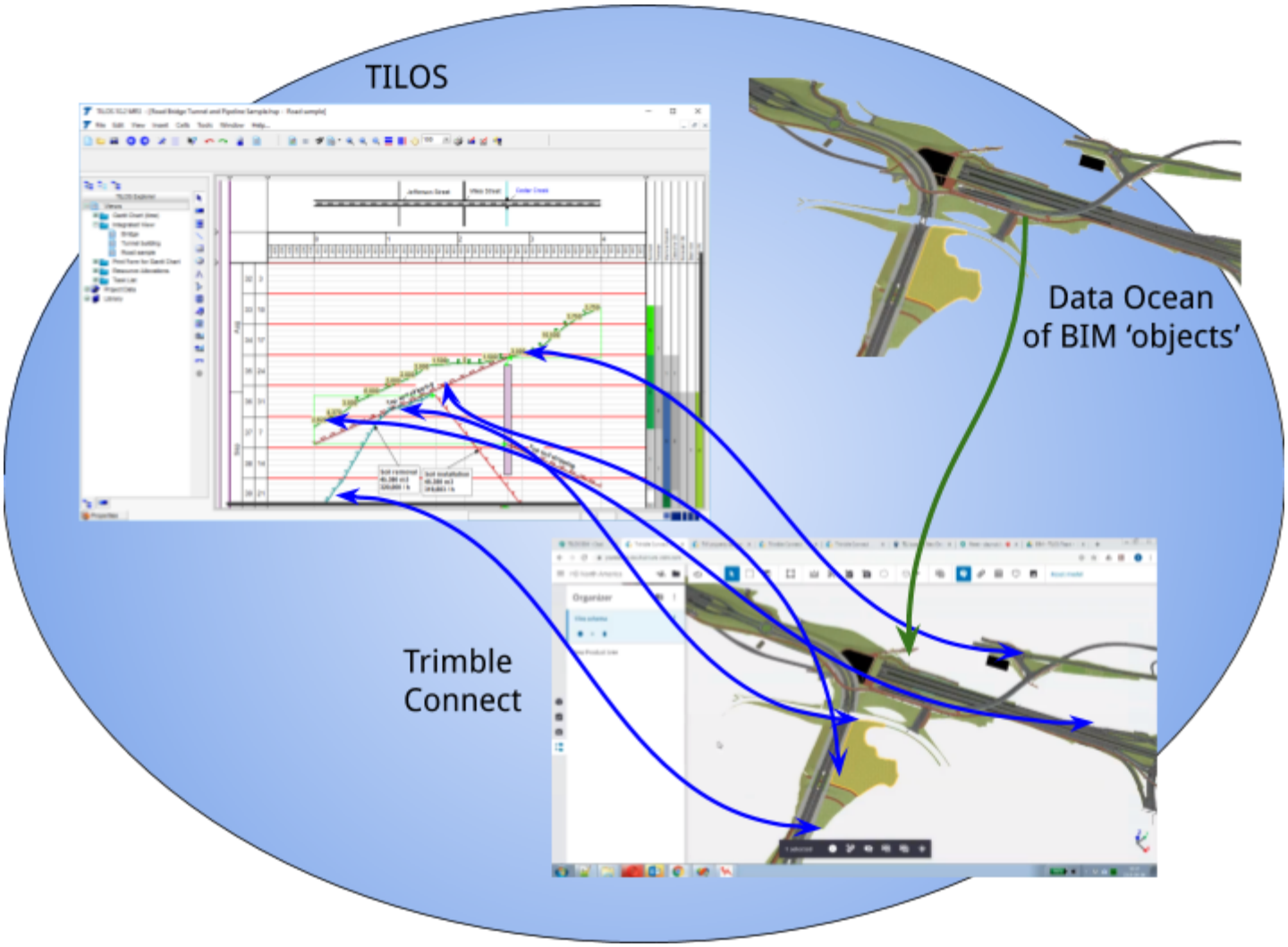
Introduction

Have you ever wished that there were another dimension available to visualize the planning and scheduling of your large and linear construction project? Well, it is now possible with the TILOS connection to BIM! Once built, a schedule file can be linked to 3D BIM objects in Trimble Connect for enhanced visualization and graphical context. The TILOS workflow remains the same prior to linking to BIM, so those who are not ready for BIM will not have to change their existing workflow at all. But for those who wish, connecting to BIM is a simple integration from the desktop, and then you can do you work in Connect web to link tasks and work elements to increase project insight.

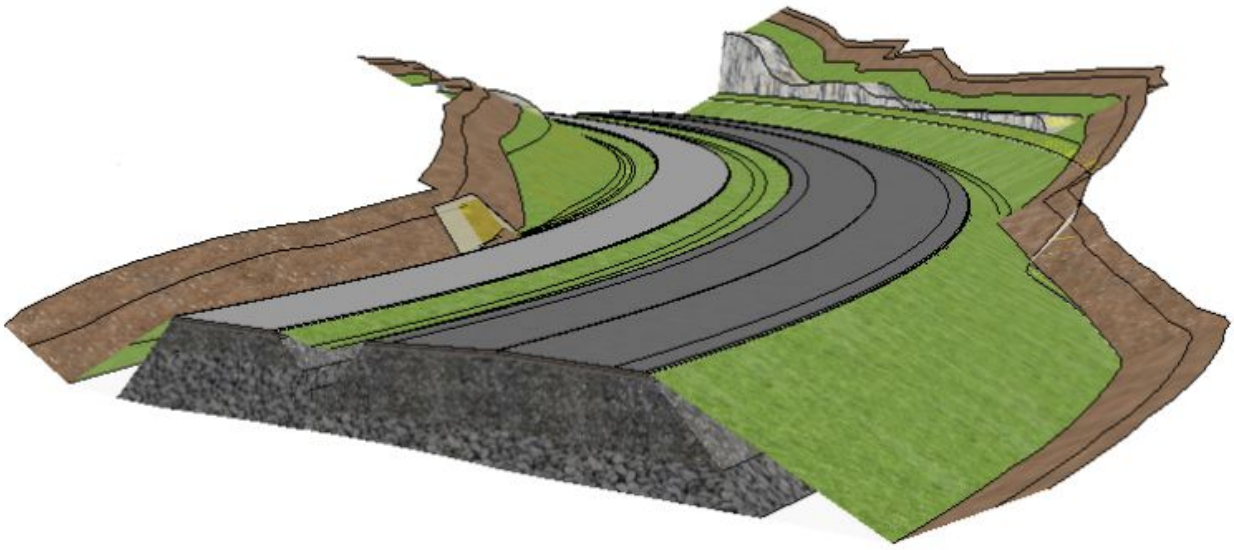


What is BIM?

Per the US National Building Information Model Standard Committee:

> "Building Information Modeling (BIM) is a digital representation of physical and functional characteristics of a facility. A BIM is a shared knowledge resource for information about a facility forming a reliable basis for decisions during its life-cycle; defined as existing from earliest conception to demolition."

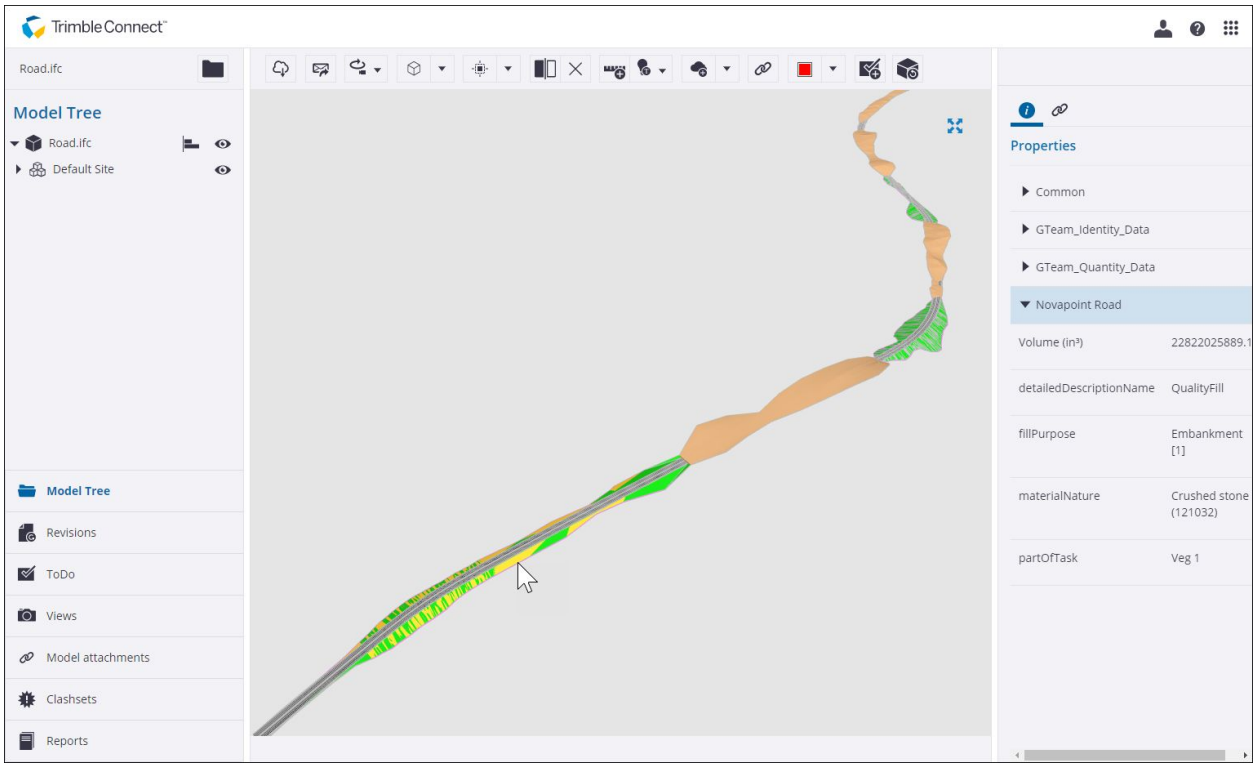
Traditionally, BIM has been used to model vertical construction (buildings), but BIM models for civil engineering and infrastructure are increasingly available:



In TILOS, BIM can be a collaborative tool that allows engineering and construction stakeholders to understand the planning and progress of a project within the context of a 3D environment. This allows team members to make informed project decisions that take into account detailed scheduling information alongside the physical representation of a project. For more about how groups across Trimble are using and promoting BIM, see: https://constructible.trimble.com/bim.

What is Trimble Connect?

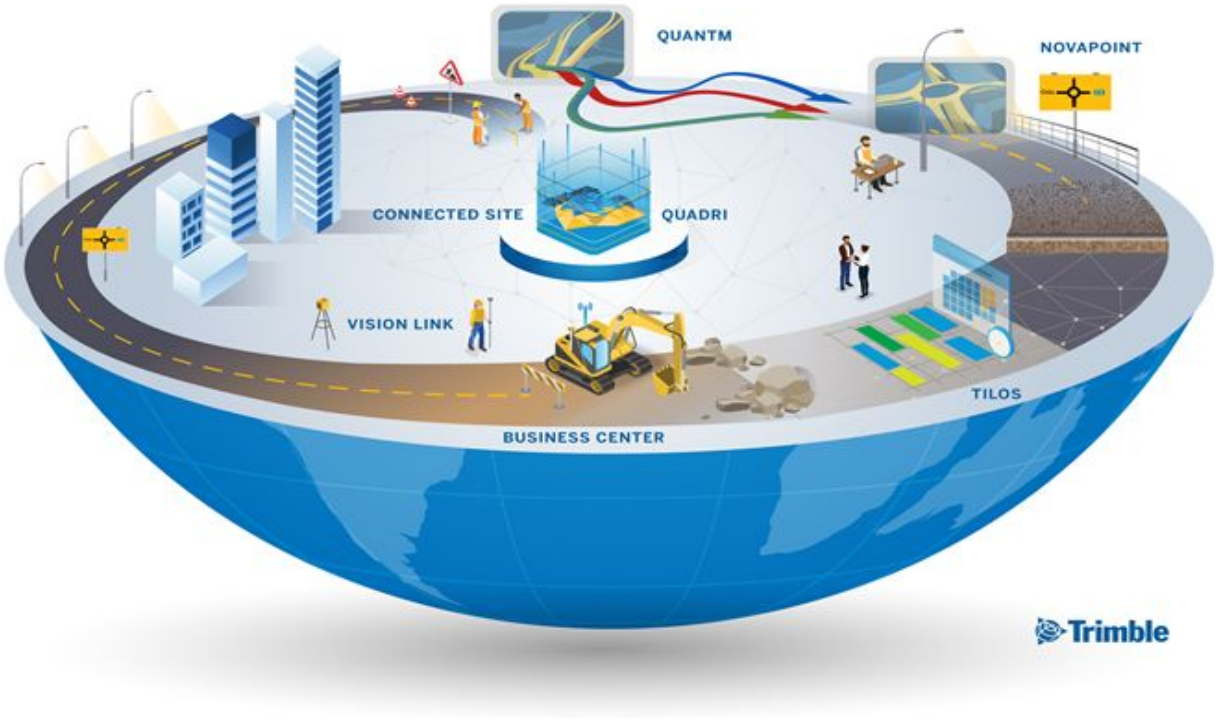
Trimble Connect is a project collaboration platform built for the construction industry. Project stakeholders can easily share, comment on, and manage the latest project information. Further, Connect supports users across the entire design, build, and operate phases of a project lifecycle. Information is made available across desktop, web, and mobile experiences, in order to best suit the users environment:



Above: *Trimble Connect 3D Viewer, with a BIM road model (in the center) and detailed element properties (on right)*

BIM Workflow in Trimble Connected Construction Continuum

The TILOS-Connect integration is part of Trimble's Connected Construction workflows. As an example, this workflow is now possible within the Connected ecosystem of Trimble:



1. Use **Quantm** to find the optimal alignment from one point to another, such as for a new roadway corridor. Export this alignment as a LandXML file.
2. Import the Land XML into **Novapoint** to add details to the road and other infrastructure, such as utilities, lighting, signage, etc. Export this infrastructure model as an IFC file. Export an XML file with mass haulage cut/fill volumes.
3. Import the IFC file into **Trimble Connect** for sharing and visualization. Import the XML file into TILOS for task scheduling.
4. In **TILOS**, lay out the cut and fill tasks along the time and distance axes. Each task will have common attributes like name, ID, begin and end dates, and start and finish stations along the alignment.
5. Setup a connection between TILOS and Connect. In TILOS, you are then able to see the data hierarchy from Novapoint in Connect.
6. Export your TILOS tasks to Connect to sync the two applications.

7. In Connect, pick an object in the 3D model to see the associated TILOS task attributes, as well as other properties from the Novapoint model.

Video Overview

More Information

Prerequisites for Using this Integration

- **TILOS 10.3** or higher version

  > **Note:** Some newer options described here were added in **TILOS 10.4**, so you are encouraged to upgrade to that version to access the full functionality.

- **Standard TILOS license** or higher
  To see what you are licensed for, select Help > License Manager. If you are not licensed, contact your dealer for help.
- **Trimble Identity (TID) account**
  These are your Single Sign-On (SSO) credentials for all Trimble apps. If you do not have a TID account, you can create one the first time you are prompted to sign in.
- **Trimble Connect account**
  If you do not have an account, visit https://connect.trimble.com/contact-us.html.
- **Access** to the Connect 3D Viewer.
- **BIM data** in the form of IFC files
  You can create these in Novapoint or get them from your colleagues.

Supporting Info

This guide consists of numbered steps, as well as supporting information formatted like this:

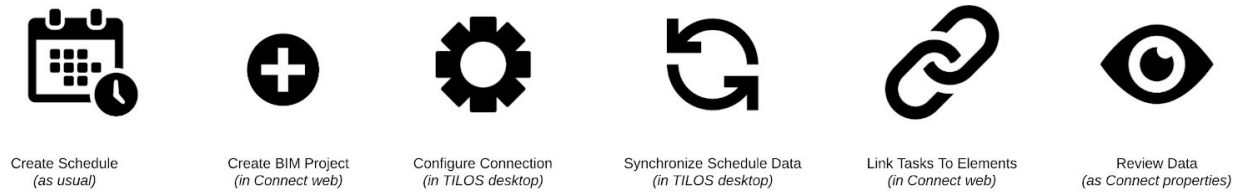
> Boxes like this contain supplemental text about the subject you are working through (meaning you can skip it if you just want to get through the steps).

You can skip over the information in these boxes if you just want to work through the procedures. For in-depth, conceptual information, you should (of course) press F1 to see the context-sensitive TILOS help.

Recommendation

You can use two side-by-side monitors to maximize the experience; one monitor can be used to toggle between this guide and TILOS desktop, while the second monitor displays the 3D model in Connect. Alternatively, you may find it easier to print this document, so that you can maximize the program on your monitor. Working from a printed copy may mitigate loss of focus related to switching between a PDF document, a 3D model and TILOS desktop.

TILOS-Connect Workflows



1. Create a schedule as usual.
2. Create a BIM project (in Connect web).
3. Configure the connection (in TILOS desktop).
4. Synchronize your schedule data (in TILOS desktop).
5. Link tasks to elements (in Connect web).
6. Review and edit the data (as properties in Connect web).
7. Resynchronize changes in Connect back to TILOS.

Detailed Steps - In TILOS

Configure a TILOS project, view, and filter for data to see in Connect

In TILOS, create a project schedule and tasks just as you usually do. Create a view that is filtered for just the data you want to see in Connect.

1. Create a schedule and tasks as usual.
2. Create a view filter for what you want to share with Trimble Connect.
3. Save your project.

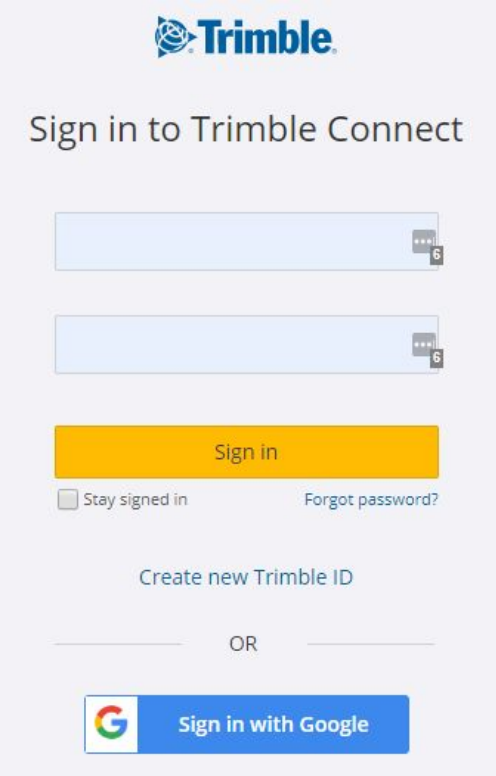
Detailed Steps - In Connect

Create an associated Connect project

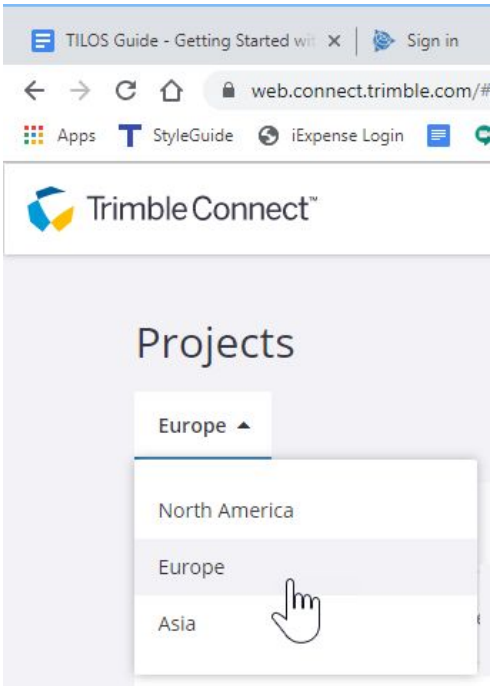
Sign in to Trimble Connect with your Trimble ID and create a project with information that corresponds to your TILOS project. For basics on using Connect, see the Trimble Connect YouTube channel.

1. Open your web browser, and go to Trimble Connect.

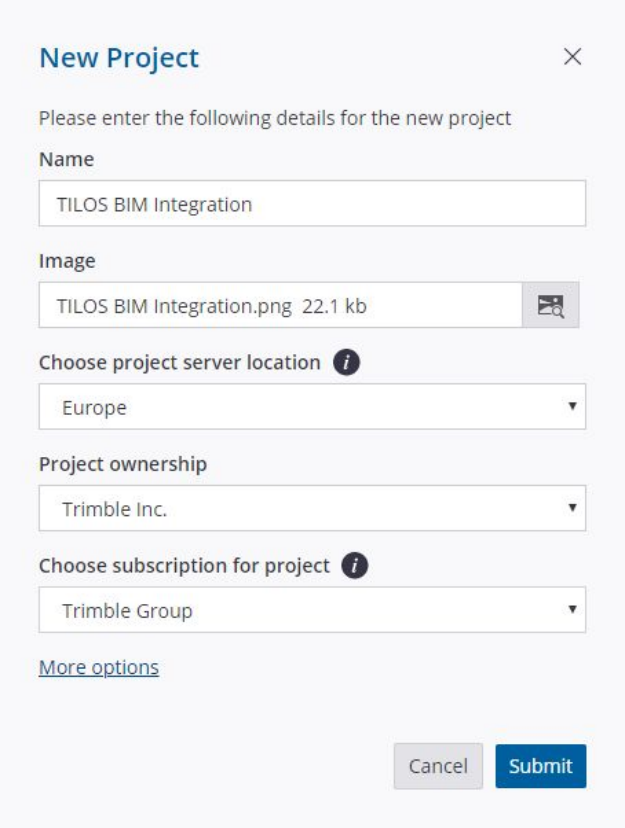
2. Sign in using your Trimble ID (TID).



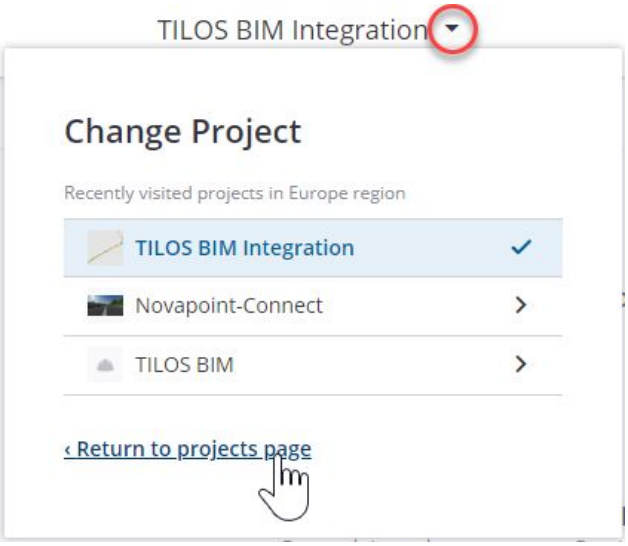
3. Under **Projects**, select your region, and click New.



4. Fill in the **New Project** information and click **Submit**.



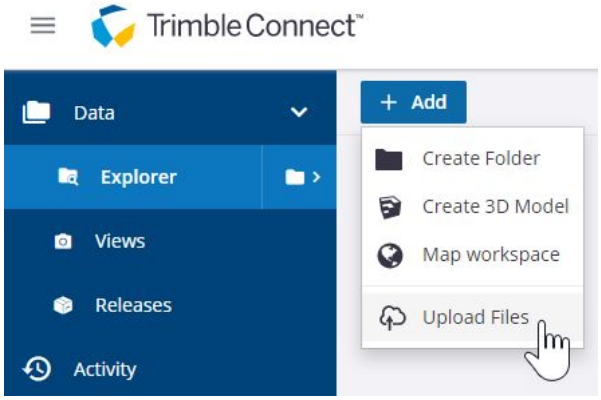
5. Your project opens automatically. Otherwise click the tile for your project in the **Projects** list. You can always return to the list of all projects by clicking the arrow next to your project name at the top of the Connect window.



Import BIM Data Related to your TILOS Project

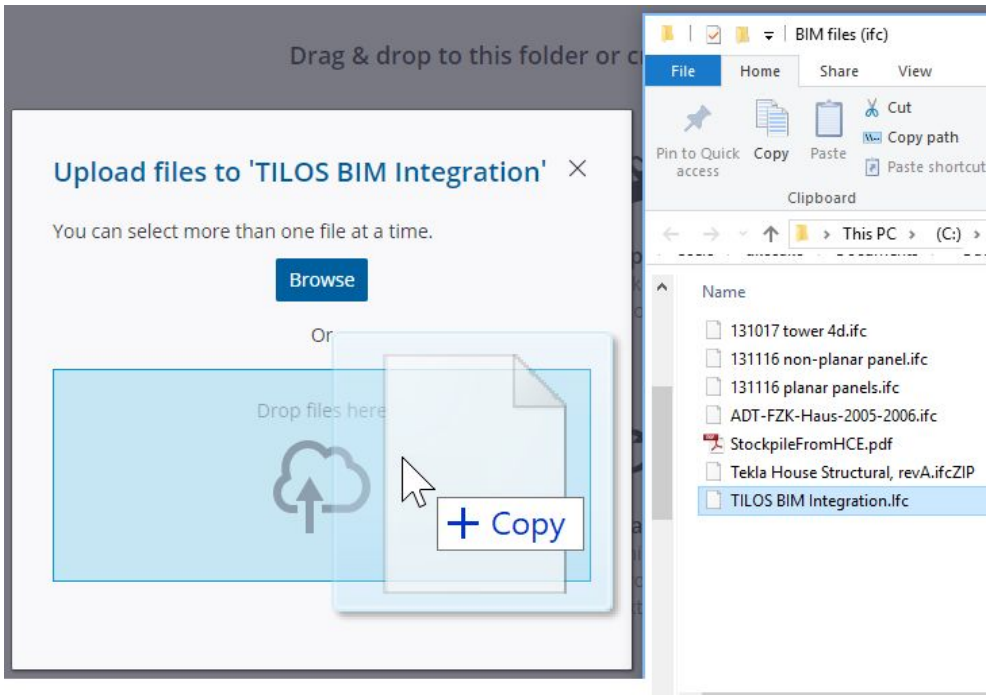
In Connect, add your 3D project model that is in IFC format. (IFC can be built from many applications; Trimble Novapoint is recommended for linear design models). Add to upload IFC files that correlate to the linear construction project you are scheduling in TILOS. This creates a BIM model.

1. Select **Data > Explorer >** + Add **> Upload Files**.

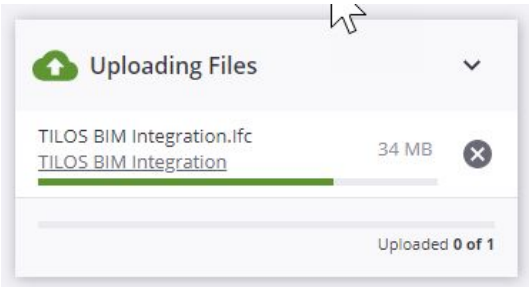


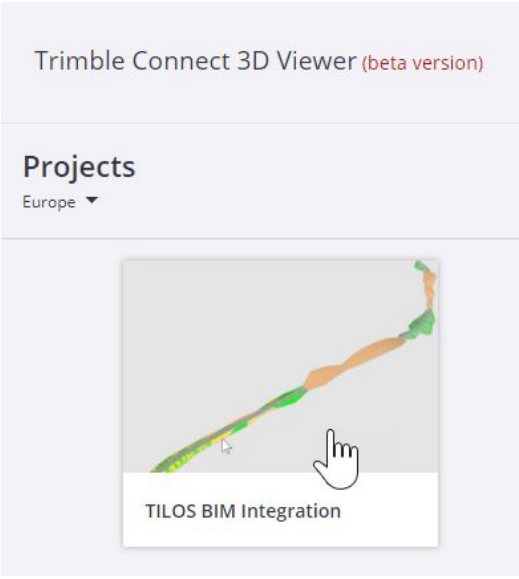
(if you are in the 3D Viewer, select View Project in Trimble Connect first).

2. Browse to and upload the IFC files that correspond to your TILOS schedule.



3. Once the upload is complete, open the Connect 3D Viewer, select your region and double-click your project tile.

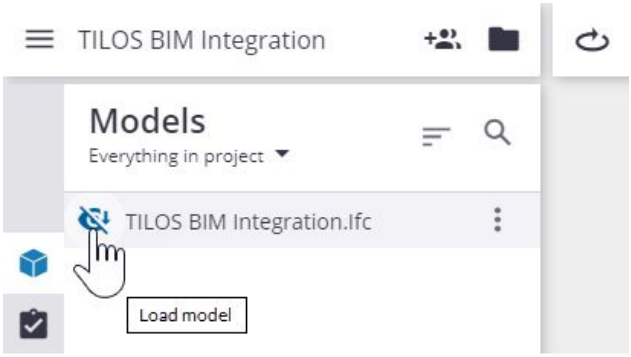




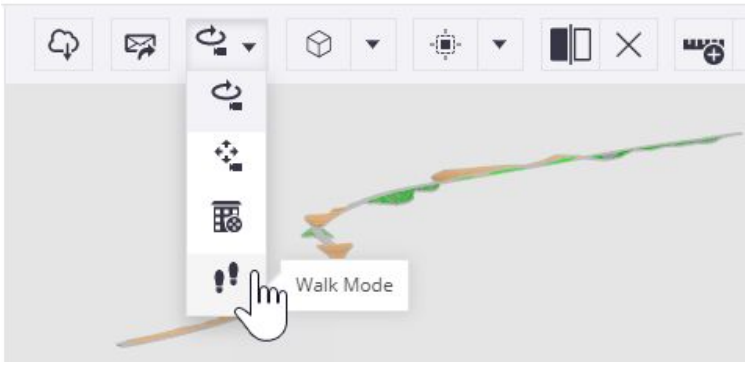
(In the released version of Connect, you can simply double-click the uploaded file name to open it in the viewer.)

Note: The typical workflow is to create and manage projects, users, and files in web.connect.trimble.com and to interact with models in 3d.connect.trimble.com. The latter is opened after selecting files or views in the web application. The 3D Viewer is a separate micro application that can be embedded in other products; it opens up a separate tab from web.connect.trimble.com.

4. Click the Models icon on the left side. Then hover over the icon next to your file name and select **Load model** (or click **Options > Load model**).



5. Use the 3D view navigation toolbar modes or these gestures to explore your BIM data:
   - Press **Control** and click-and-drag to rotate the model.
   - Press **Shift** and click-and-drag to pan the view.



Note: In the 3D Viewer, you can always click the **View in Trimble Connect** icon to return to the released version of Connect.

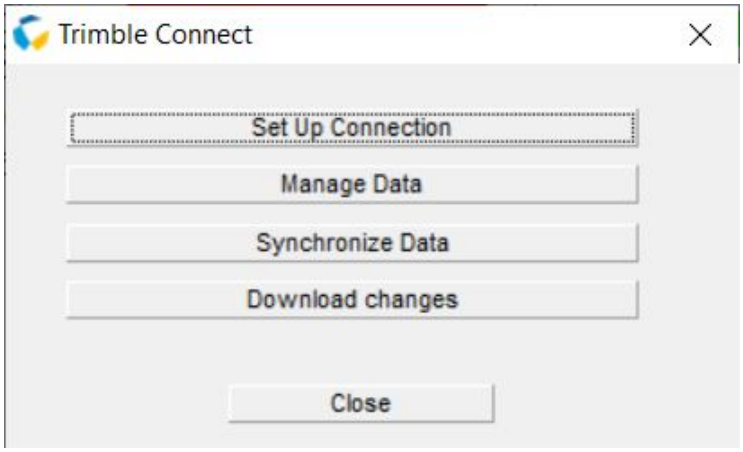
In TILOS

Set Up a TILOS Connection to Connect

In TILOS, make your connection to Connect by specifying the time zone, region, and task filter you want to use. This initial connection will push your TILOS tasks and their properties to Connect for the first time.

Note: The first command you launch that requires a connection with Trimble Connect may prompt you to log in if you have not already done so. If you need to sign in as a different user, select **Tools > Trimble Connect data > Logout** from Connect. Then sign in again.

1. In TILOS, click the Trimble Connect icon on the toolbar or select **Tools > Trimble Connect Data** in the menu.



2. In the **Trimble Connect** dialog, click **Set Up Connection** to enter the settings required to make the connection with Trimble Connect.

3. Click **Refresh Regions** and select your project's **Time zone** and **Region**. If you are logged out of Connect, you are prompted to login again using your TID.

4. Click **Refresh Project** List and select your Trimble Connect project that you want to exchange TILOS data with.

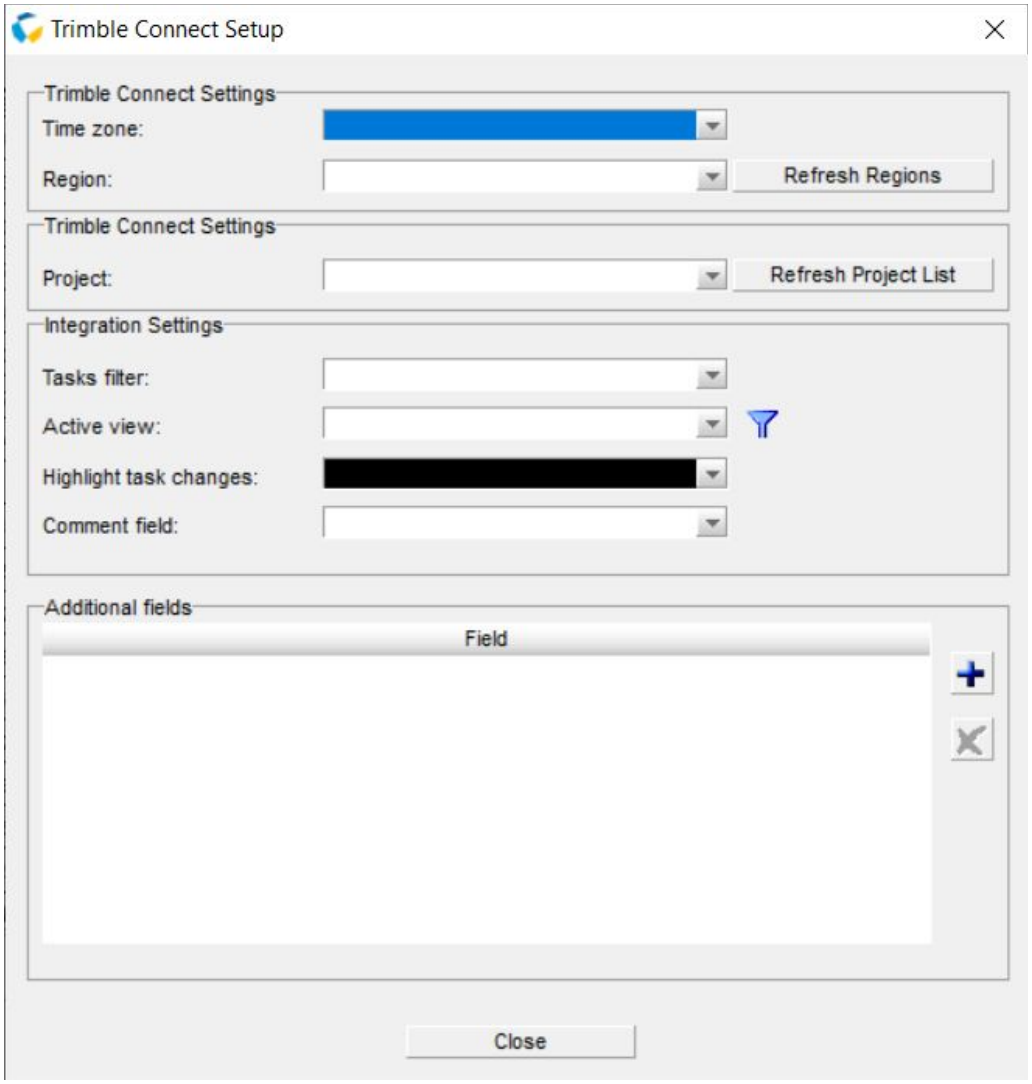
Note: If you refresh the **Regions** or **Projects** list when you are already signed in to Connect, you may receive this web page error:

"This page isn't workinglocalhost didn't send any data.
ERR_EMPTY_RESPONSE."

This is because the login page determines that you are already signed in, so the browser only sends back this info. TILOS gets data from TILOS, but the page stays

empty since there is no need to show the login page. Simply sign out of Connect, and try to refresh the list of Connect projects again.

5. Under **Integration Settings**, you can choose a TILOS **Task filter** and **Active view** (if you have multiple views) you configured to share with Connect, but this is optional. These settings enable you to cull the data to just there information that is relevant to share. If you leave these fields blank, no filters are applied, so all data is exported for Connect.



6. Set the **Highlight task changes** color to make unaccepted changes in the list easier to distinguish.

7. In the **Comment field** list, select the field you are using to add notes and other descriptive information.

8. By default, the TILOS-Connect data exchange is limited to basic data (task ID, name, start/end dates, and start/end locations). To include other types of information, add **Additional fields** as desired.

9. Click **Close**. Your settings and any changes you make are saved automatically as you make them. Once you have set up this connection, you should not need to do it again unless you need to change one of the settings. When you are connected, the **Trimble Connect** icon on your toolbar will be flashing.

10. Click **Synchronize Data** to send your TILOS data to your Connect project.

11. Click **Close**.

In Connect

Link TILOS tasks to BIM objects in the Connect 3D Viewer

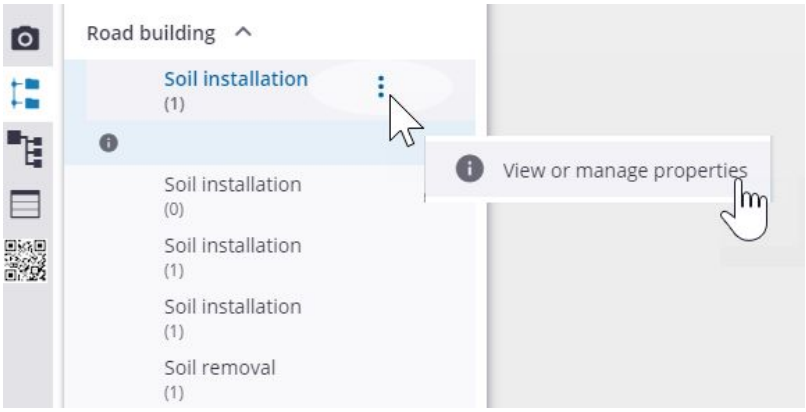
In Connect, review your project tasks. The data you see in the Organizer is identical to what is in TILOS, including the task names dates, durations, and completion percentages. Then link any of the tasks with BIM objects in the 3D Viewer's model to establish a connection between them. When you select a task, all linked objects will be highlighted in the model. If you pick an object in the model, all linked tasks will highlight in the Organizer. Reviewing the properties of the BIM objects can help you understand the schedule in the context of the 3D model.

Note: Even though you see the same folders and files in TILOS and Connect, there is no connection until you link tasks to objects in the view.

1. If needed, re-open the Connect 3D Viewer, select your region, and double-click your project tile.

2. Click the **Organizer** icon, and click the arrow next to the name of your sub-project (which you can find in TILOS under **Explorer > Project Data > Sub-Projects**) to expand the list of tasks, which are the same tasks as in TILOS.

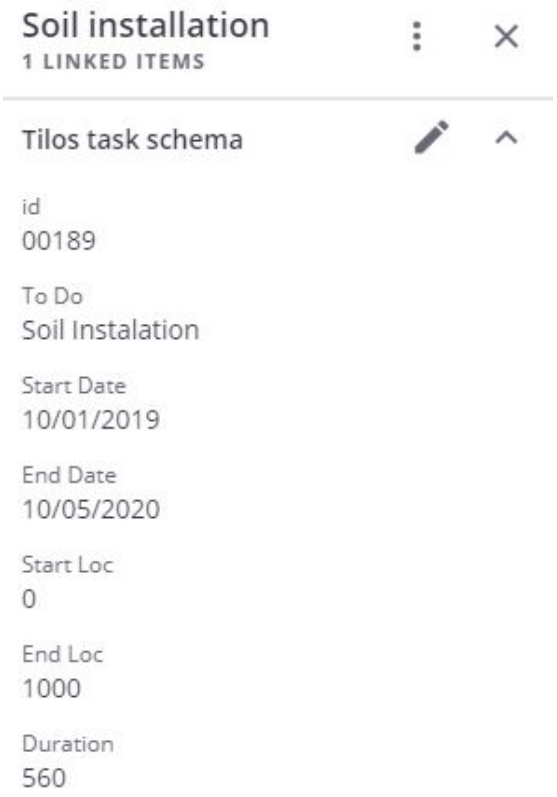
3. Click the ⋮ icon and select **View or manage properties**.



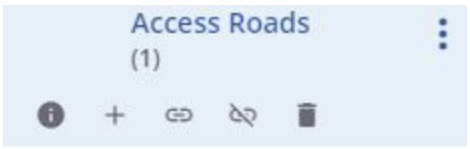
4. Review the properties of the task. They include:

    - task name
    - task start date
    - task end date
    - duration (in days)
    - percentage complete

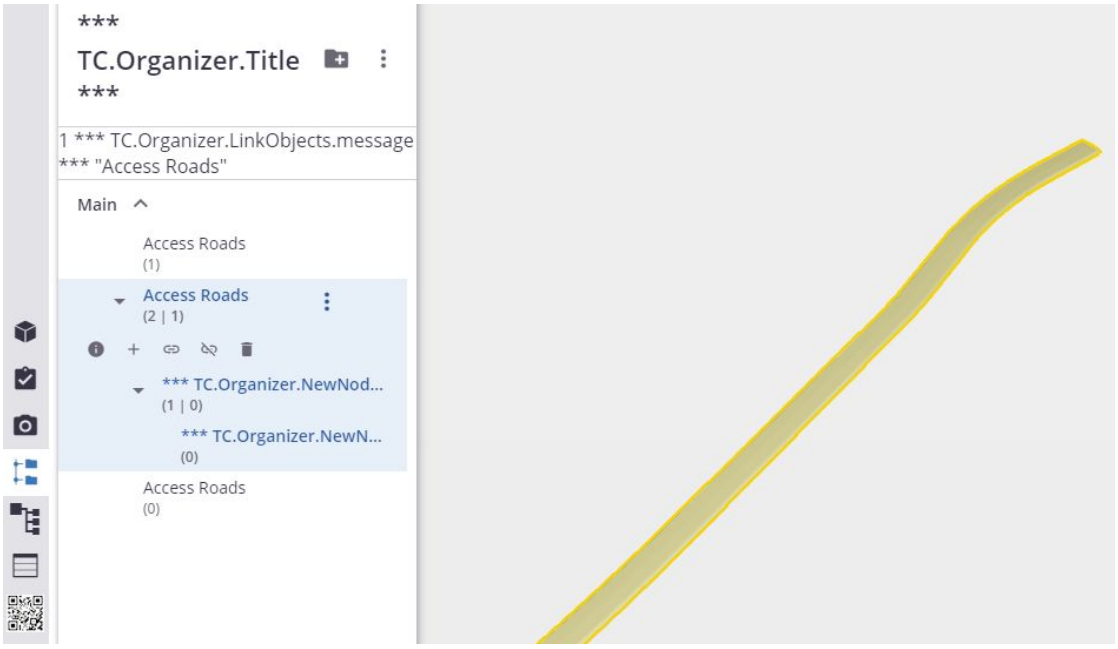
Click the Edit icon to modify any properties. You can later resync whichever of these changes you choose back to TILOS.



5. Load your 3D model again by clicking the **Models** icon, and hovering over the icon and selecting **Load model** again.
6. To link a task with a model object, pick the object in the view and click the **Link objects** icon. You can also use the other icons here to add/delete a subgroup and to unlink a task from an object. In TILOS, if there is a summary task, it can be shown as a subgroup.



a. Validate the links by picking objects to see tasks highlight and vice versa.



In TILOS

Synchronize data between TILOS and Connect as you make changes

As scheduled tasks and progress change, push the new information (tasks and files) from TILOS to Connect. If you import new IFC files into Connect, pull that task and file information from Connect back into TILOS. This integration enables you to understand your project schedule in the context of BIM objects in the 3D model. For example, if you select a road milling layer in Connect, you can see its start and end dates and progress.

1. After you make changes to tasks, dates, or progress in TILOS, open the **Trimble Connect** dialog and click **Synchronize Data**. You do not need to save your project first.
   If you do not save your TILOS project, the data that was sent to Connect will remain there until you synchronize again. At that point, Connect will detect the available data on the server so it stays in sync with TILOS.

   - **Upload Data** - Push data (as you configured it in the Manage Content dialog) to Trimble Connect.
   - **Download Changes** - Pull new/modified data (as identified by the Property Set service) fromTrimble Connect into TILOS.

2. In **TILOS Explorer**, right-click **Views > New View**. In the **Create New View** dialog, select **Connect changes** as the **Type of view**.

3. In the explorer, expand **Views > Connect** changes, and select **Web changes** to see the list of tasks created or modified in Trimble Connect. Use the options to cull the list by:

    - **Not accepted** - See the changes made in Connect that are not yet in TILOS. To bring this change in, right-click the row and select **Accept changes**.

    - **All tasks** - See tasks that appear in either TILOS or Connect, regardless of whether they have been synchronized or not.

    - **Accepted in last <x> days** - Use this to shorten the list of recently accepted tasks.

    - **Selected filter** - Apply a TILOS task filter to the list

    - **Changes tab** - Click this to see a summary of changes made to any selected task.

4. Click the tab at the bottom of the TILOS Explorer to open the **Task List**.

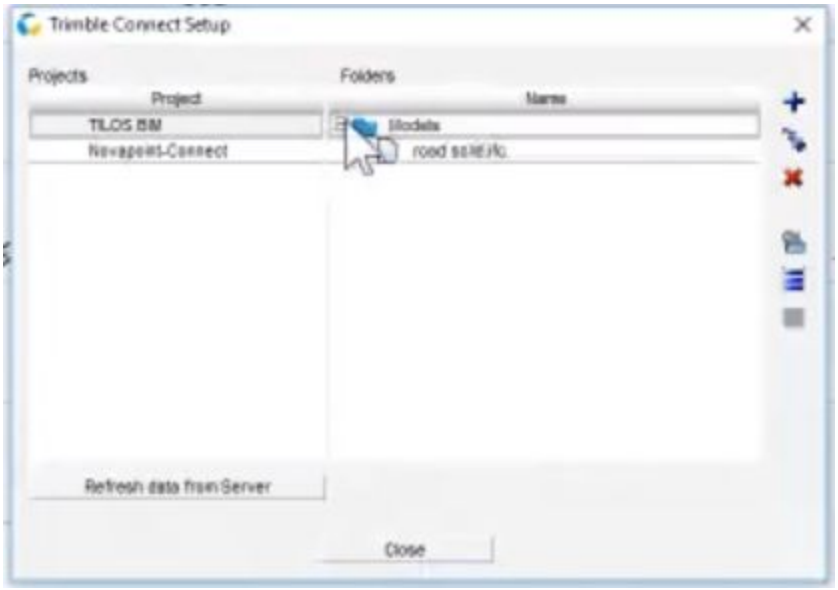
5. Click any task that is highlighted (using the **Highlight task changes** color described above) to bring it into focus in the active view. Review the attributes in the **Object Properties** pane, in particular on the **Web Changes** tab.

6. Then return to the **Task List** to accept the changes to the task as needed.

7. In the **Trimble Connect** dialog, click **Manage Data** to see the hierarchy of objects on the Connect server, and to perform all the administrative functions for folders and files (as you can do in Connect), such as:

    - Adding folders and more IFC files to Connect
    - Removing folders and files
    - Organizing tasks into subgroups.
    - Export an XML file of the tasks shown for use in other software like Microsoft Project.

- Rearranging your Connect project



8. Select the project you want to manage in the left pane.
9. Select folders and files in the right pane and use the icons on the right to perform the administrative tasks.
10. To refresh changes made in Connect in this dialog, click **Refresh from Server**. Changes you make in TILOS are refreshed in Connect automatically.
11. In Connect, select a task and click the **Info** pane to see any new/modified properties pushed from TILOS.
12. Click the **Edit** icon to make changes to attributes, including the percentage of **Progress**.

Supported Scenarios

- Can a TILOS project connect to more than one Connect Project?
  - **Yes**.
- Can multiple TILOS projects adjoin one Connect Project?
  - **Yes**. This enables multiple people using different instances of TILOS to contribute to the information in a Trimble Connect project.

Troubleshooting

When you have questions, your best source of help is the TILOS Community.

Reaching Sales, Support, and the Community

For more information, please use these resources:

Trimble TILOS Community

Search for the latest content, ask a question, see answers to other user questions, start a discussion, or post your own helpful content. TILOS Community

Technical Support Hotline

- Hours:
  - Monday to Thursday: 08.30 am - 5:30 pm (GMT +1)
  - Friday: 08.30 am - 1:00 pm (GMT +1)
- Phone: +49 721 - 4647 - 2829 (Europe)
- Email: TILOS@trimble.com

When contacting the hotline, please be prepared the following information:

- Your software product ID
- Your company name and address
- The current software version
- Which operating system (OS) you are working on and the assigned User Rights

Sales and Product Information

- Europe phone: +49 721 - 4647 - 2829
- Americas phone: (937) 245-5154
- Americas toll-free phone: (800) 361-1249
- Web site: https://construction.trimble.com/products-and-solutions/TILOS

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