



Tilos 11

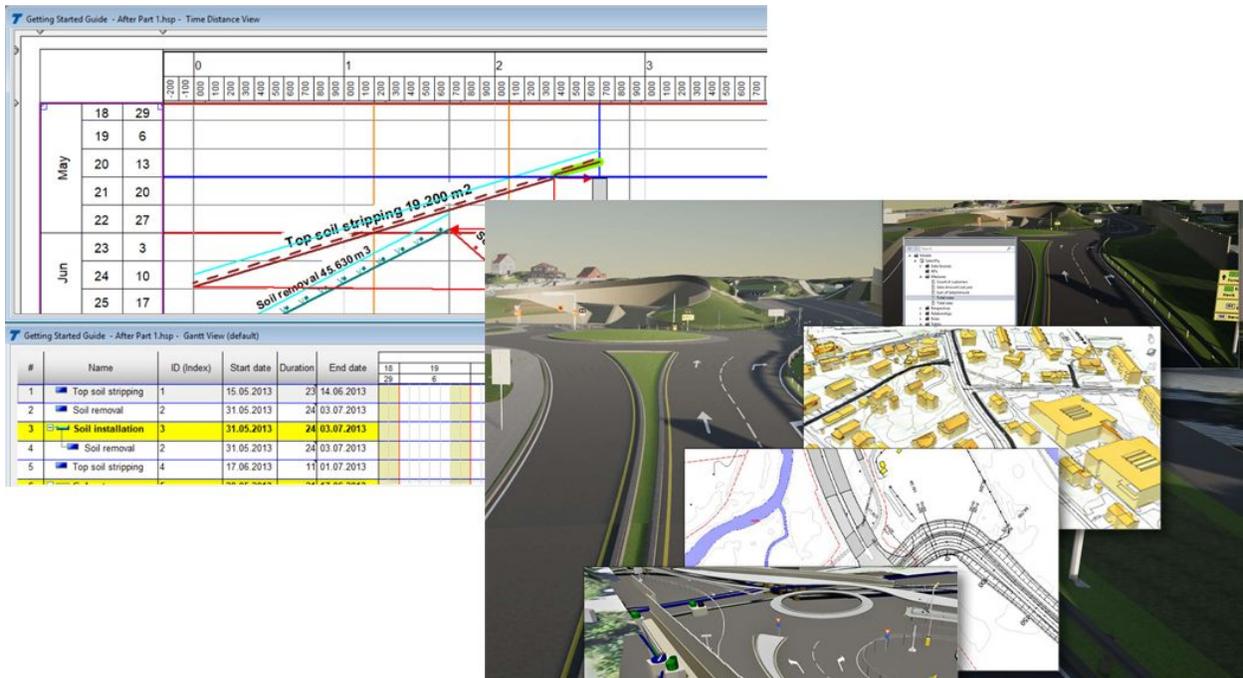
Exchanging Data with Quadri

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Introduction

In addition to the Tilos - Trimble Connect integration, you can also visualize the planning and scheduling of your linear construction project with the Tilos connection to Trimble Quadri!

Utilizing the Quadri Task Connector API, it is now possible to set up a bi-directional data exchange link between Quadri and Tilos, giving schedulers direct access (no file transfers) to all design data within the Quadri BIM model. Any modifications made to the BIM model can later be easily updated and analyzed in Tilos. As the connection is bi-directional, it is also possible to “publish” the schedule back to Quadri, making its information accessible to all other users with access to the Quadri BIM model.

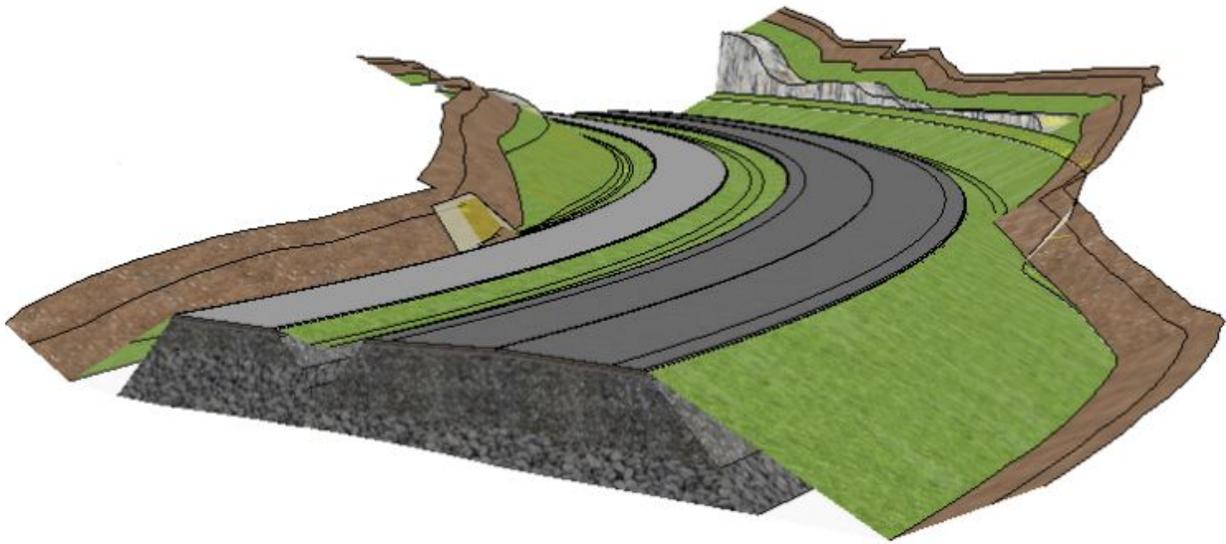


What is BIM?

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 Quadri?

Trimble Quadri is a cooperative platform for infrastructure projects. Quadri empowers real-time collaboration in one central model while it enables you to keep track of changes and access the model seamlessly anywhere, at any time. For more information, see the [Quadri product page](#).

Quadri represents a digital architecture that spans the full infra-asset lifecycle, enabling data to flow seamlessly between all project stakeholders and work processes, in a multiuser environment, providing one source of truth. In most projects you do not work alone or with tools from only one vendor. With Quadri you work friction-free and fast, independent of your favorite engineering tools in a live-updated model. The shared model enables the team to have a common understanding of the existing situation across all infrastructure disciplines. Find out more at quadri.trimble.com

Workflow in Trimble Connected Construction Continuum

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



More Information

Prerequisites for Using this Integration

- Tilos 11.0 or higher version
- 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 Quadri 2020
- Quadri 2020 license
- BIM data in the form of a Quadri model
- Working knowledge of Quadri

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 focus issues related to switching between a PDF document, a 3D model, and Tilos desktop.

Tilos - Quadri Workflow

Using the new Tilos - Quadri workflow, you can:

1. Create or open a Tilos project with scheduled tasks.
2. Create a view filter for the data you want to exchange with Quadri.
3. Install the Quadri Connector and Quadri Task Templates.
4. Configure settings for the time zone, sub-project, and sector type to use for data exchange.
5. Map Quadri feature types to Tilos activity templates.
6. Map Quadri task properties and Tilos activity properties to each other.
7. Connect from Tilos to a Quadri model.
8. Specify which task and feature properties to make available and download them from Quadri to Tilos.
9. Review and filter the Quadri data in Tilos.
10. As you make schedule changes in Tilos, upload them back to Quadri to stay in sync.

Preparing Quadri Data for Tilos

Quadri typically contains digital models of planned structures, e.g., roads, bridges, tunnels etc. (sometimes referred to in BIM as “digital twins”). Such models include sets of features with geometry that define their shapes and locations, along properties that describe their content and behavior. The goal in this Tilos - Quadri integration is to prepare and transfer relevant information in Quadri that can be used for scheduling purposes in Tilos.

Steps in Tilos

Configure a Tilos project, view, and filter for data to see in Quadri

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

1. Using any project template, create a schedule as usual. In these steps, we will use a project with cut and fill activities as an example.
2. Create a view filter for the activities you want to share with Quadri.
3. Save your project.

Steps in Quadri

Open an associated Quadri model

Sign in to Quadri with your Trimble ID and open a model with linear construction work that corresponds to your Tilos project.

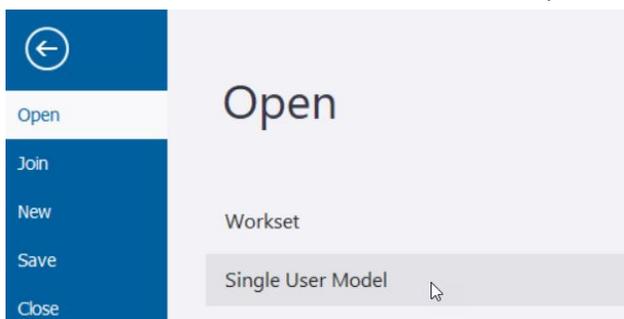
For the basics on using Quadri, see the [Trimble Quadri YouTube channel](#) or the Getting Started page on the [Quadri Resource Center](#).

1. Open Quadri.

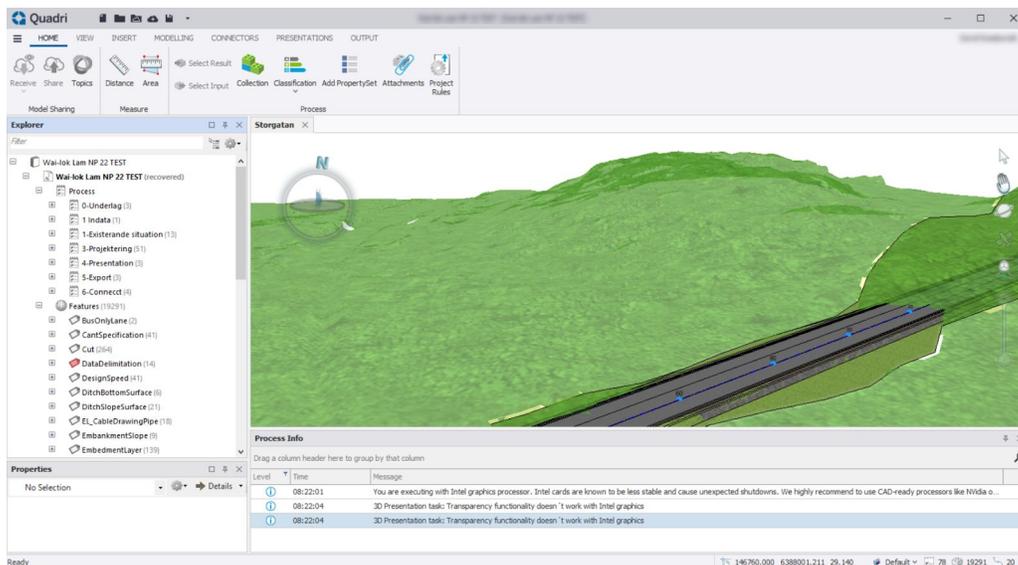


2. If prompted, sign in using your Trimble ID (TID).

3. Click the  icon (if needed) and click Open > Single User Model In the left menu.



4. Browse to your Quadri model (.quadrimodel) and click Open.



If you have trouble, see Troubleshooting at the end of this document.

Link Quadri tasks to Tilos activities

Some of these steps are to familiarize a new user with parts of Quadri's interface. If you are already familiar, skip to the next section on making Quadri Tasks available to Tilos.

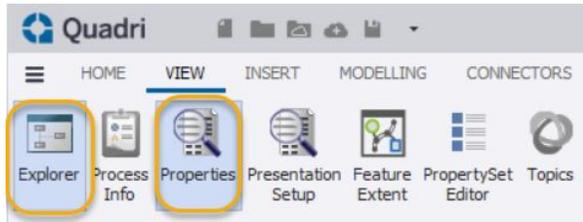
Note: If you are not familiar with Quadri, visit the [Quadri Resource Center](#). These are some parts of the interface you will see here:

- **Explorer** - Shows the content on your model divided into three sections:
 - **Process** - These tools allow you to organize your data in a flexible, chronological workflow or task process, from, e.g., Import > Terrain creation > Existing situation model > Alignment design > Road modeling. You can select, right-click, and edit any task in the process at any time. Tasks are parametric; they have dependencies based on the tasks above them in the Process hierarchy (this is a relational model).
 - **Features** - These are the objects created by your process tasks.
 - **Network Elements** -
- **Properties** - These are the detailed attributes of selected items.
- **Graphic View** - This is the large window in which feature data appears.

Note: An activity in Tilos is not the same as a [task](#) in Quadri. "Task" is a widely used concept and term in Quadri, and differs slightly from how it was used in Tilos.

- **A task in Quadri** is part of the Quadri Task Model and can, e.g., have relationships to and dependencies on other tasks. A task in Quadri is usually the process of creating and maintaining data inside the model.
- **An activity in Tilos** typically describes a piece of work that has to be executed in time and space in order to build something.

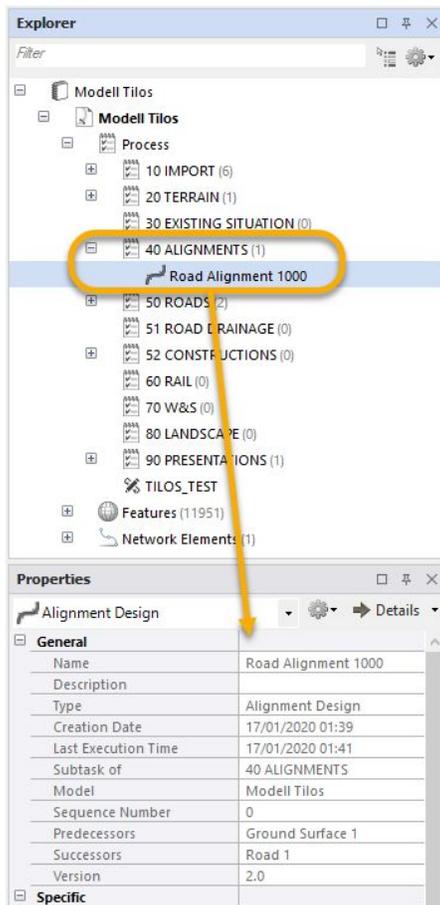
1. On the ribbon, select View and click Explorer and Properties to open those panes.



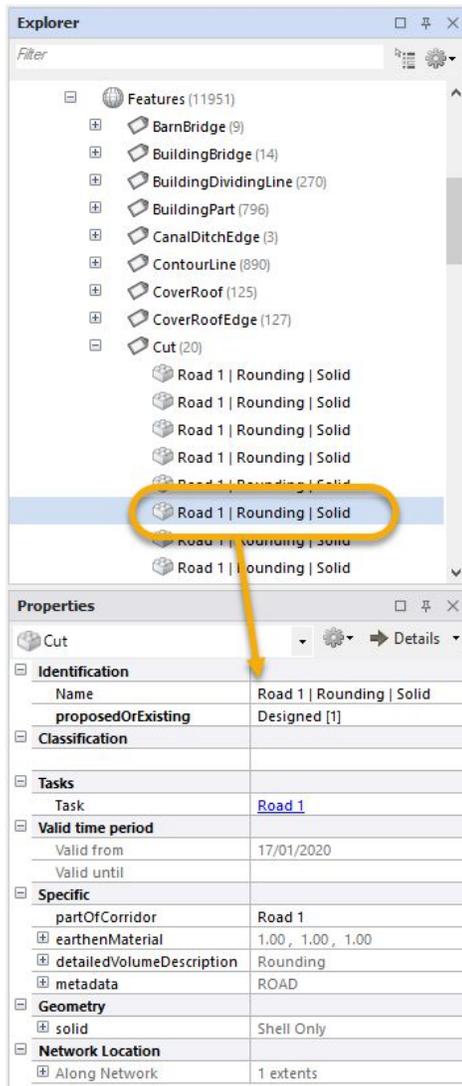
2. Select the Connectors ribbon tab and click Design; Design is a 'general' type of connector (as opposed to the specific connectors for Trimble SketchUp and AutoDesk Civil 3D).



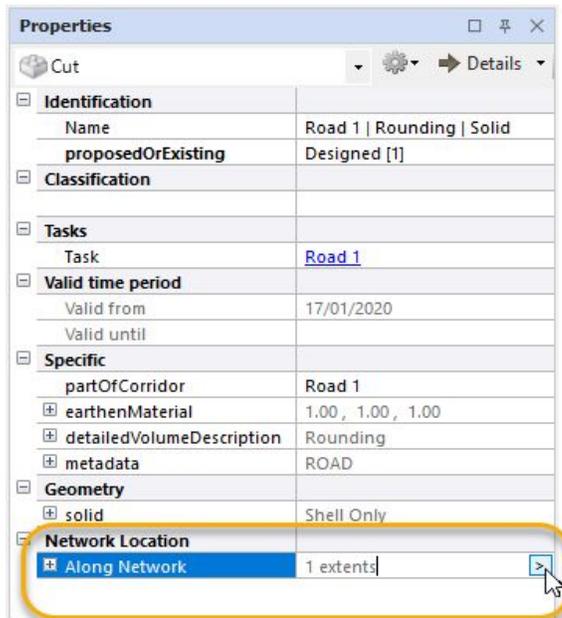
3. In the Explorer pane, click the + next to Process and one of the tasks (also called "tools") that you want to send to Tilos beneath it. Review the attributes for the selected task in the Properties pane.



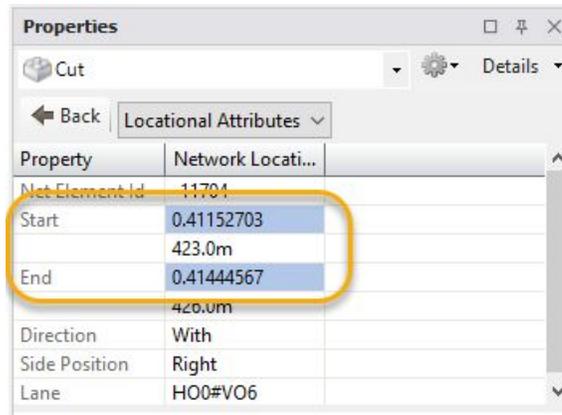
- Also expand Features in the Explorer, and pick one of the objects created by a Process task you need in Tilos to review its properties.



- In the Properties pane, scroll down to the Network Location section, and click the arrow at the right of the Along Network field.



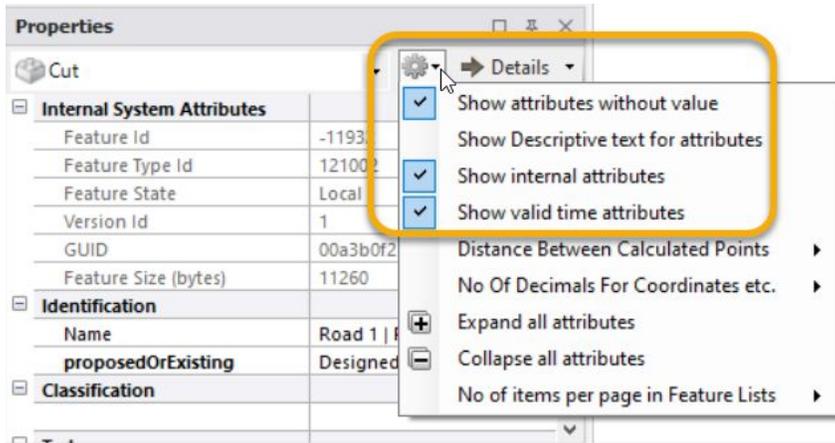
- In Locational attributes, specify for Tilos where the activity should be positioned (e.g., using a station range) along an alignment or other linear feature. Click Back when you are done.



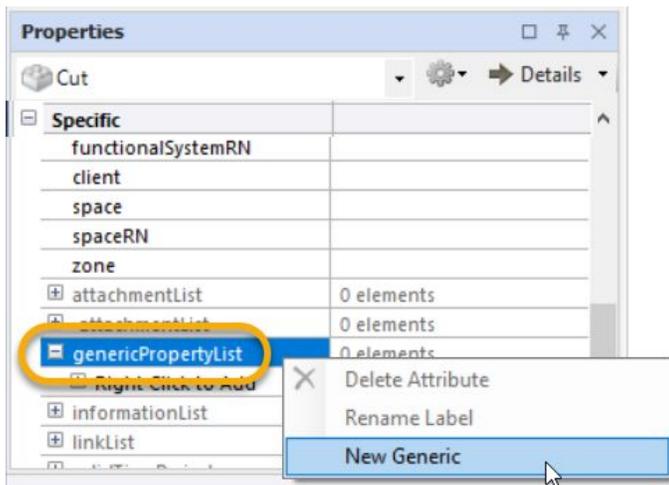
Note: In Locational Attributes, stationing or distance along is always specified as a factor between 0.0 and 1.0).

- In a feature you intend for data exchange, it is also important for you to create generic properties that can map to specific fields in Tilos. First, ensure that you can see the Generic Property List by clicking the Settings icon at the top of the Properties pane and confirming that Show attributes without value and Show internal

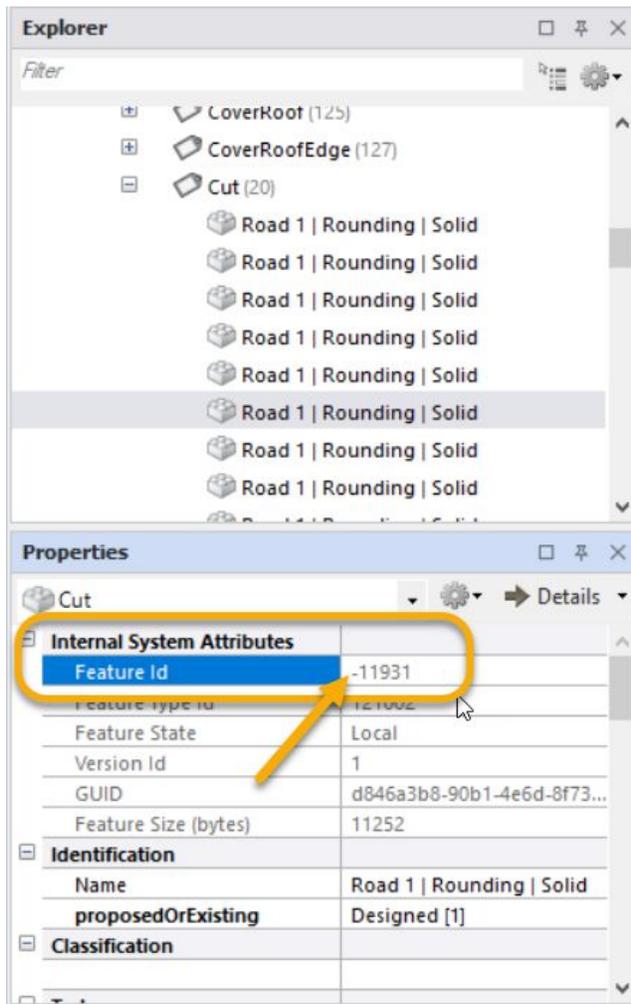
attributes are enabled.



8. Then scroll down to the Specific section, right-click genericPropertyList and select New Generic.

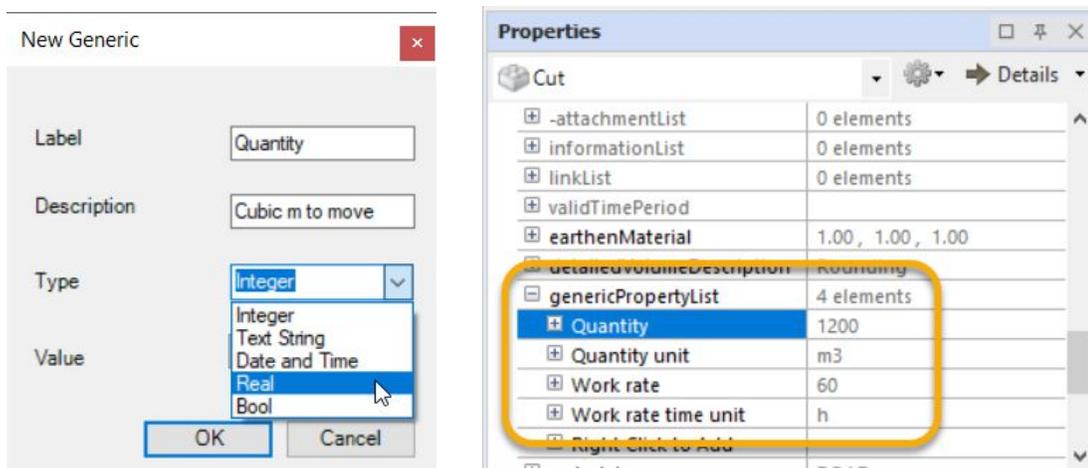


- You will also probably want to note the unique IDs of features you want to check in Tilos. Using these IDs makes them easier to find when feature names are not

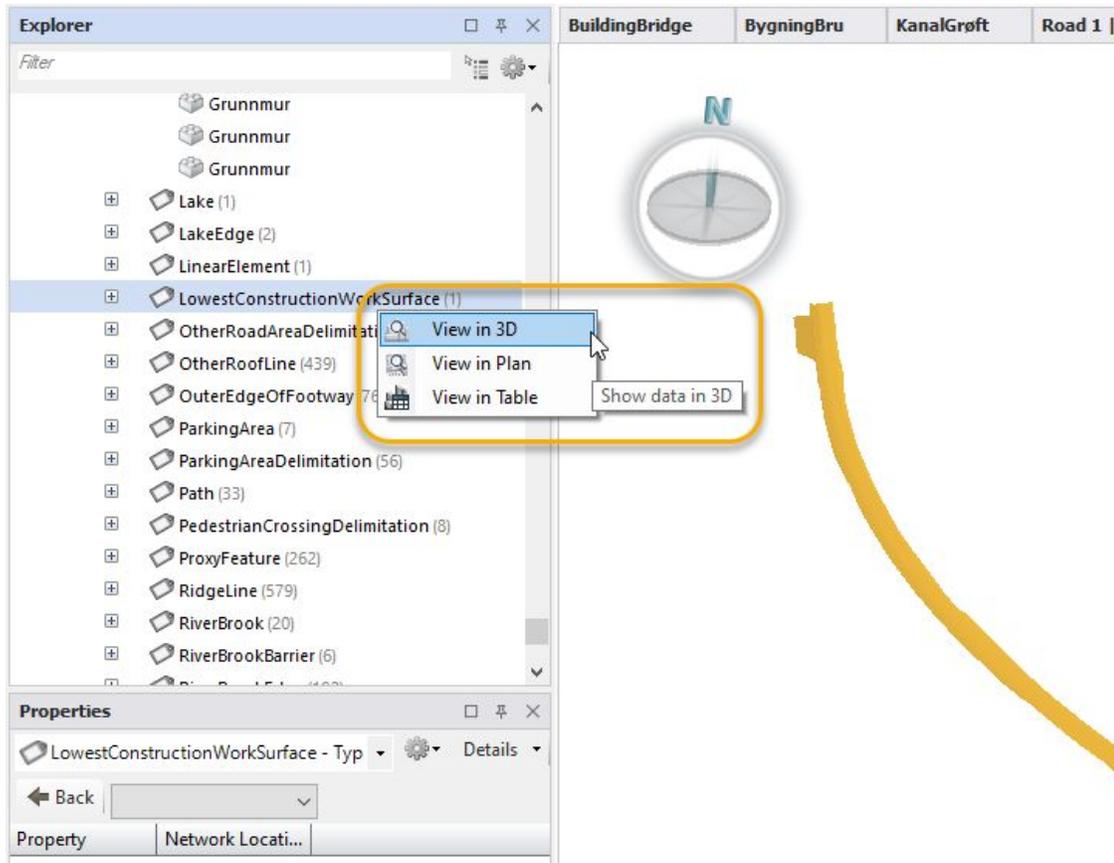


unique.

- Add as many generic properties as you need, e.g., Quantity, Quantity Unit, Work Rate, and Work Rate Time Unit.



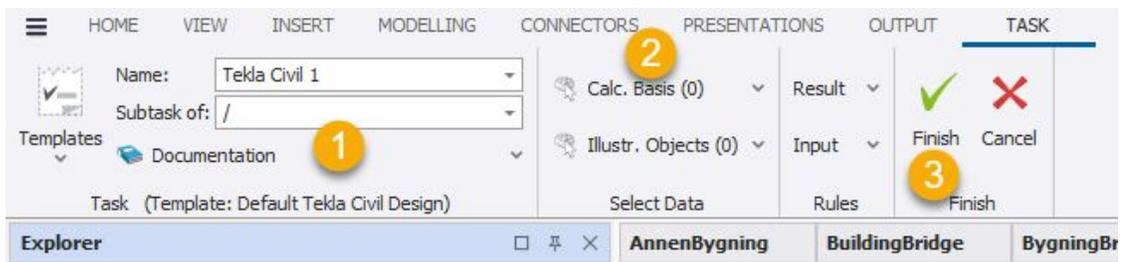
11. To see a feature graphically, right-click it and select View in 3D (or View in 2D).



Note: You can control the graphic view's background color by selecting View > Presentation Setup. Then modify the settings in the Presentation Setup pane.

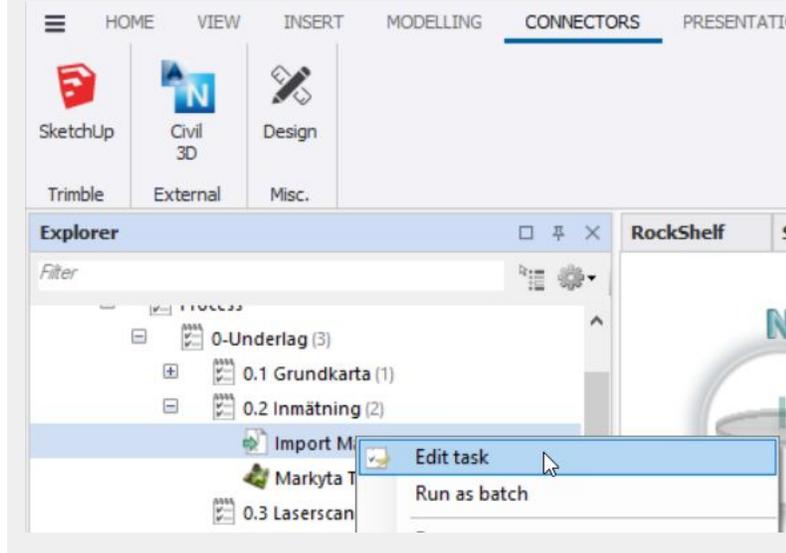
Make Quadri task data available to Tilos

1. Back on the ribbon, make any required changes in the Design Tools section (1 below) on the ribbon. Press F1 for details at any time.

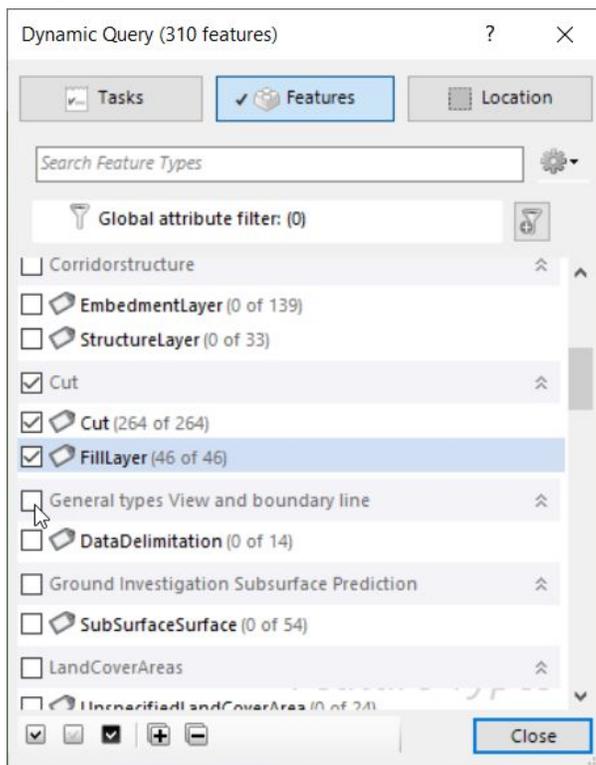


Note: You cannot create data outside of a task. If you do not see the options above, you might not have Connectors > Design selected. You can

simply right-click a task and choose Edit task.



2. Then click Calc. Basis (2 above) to open the Dynamic Query dialog.
3. Click the Features button and check the box for each feature (e.g., cut, fill, structure, subgrade, etc.) you want to export to Tilos for scheduling as activities.



4. Click Close.

- Click Finish on the ribbon when you are done. The results/output are stored in the tool and in the Features section of the Explorer. Doing this updates the model with your changes.



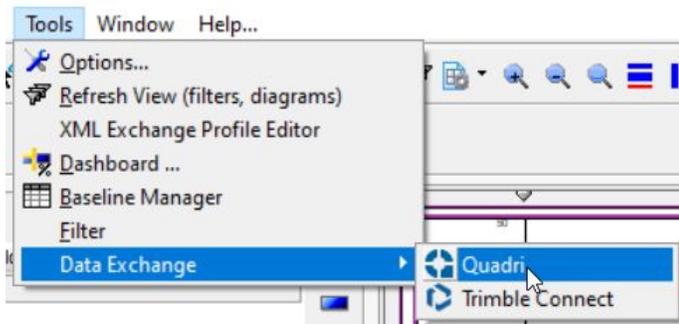
Important: Keep the Quadri project that is sending data to Tilos open when you work in Tilos.

Steps in Tilos

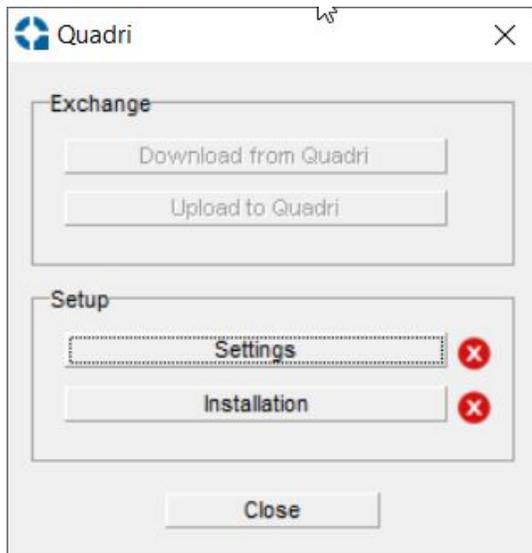
Configure your Quadri connection and data exchange settings

In Tilos, make your connection to Quadri by specifying the time zone, project, and sector type that you want to use. This initial connection will push your Tilos activities and their properties to Quadri for the first time.

- Select Tools > Data Exchange > Quadri.



2. You will see these options:

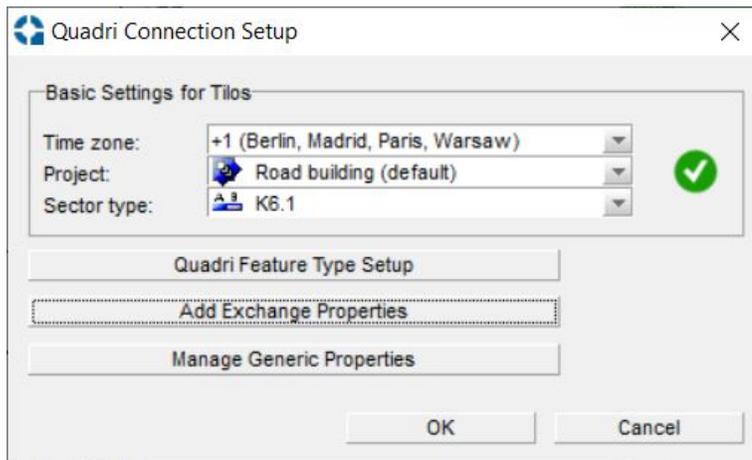


- Download from Quadri - Bring Quadri task features and properties into Tilos.
- Upload to Quadri - Send Tilos activity properties to Quadri tasks and features.
- Settings - Configure settings for the time zone, sub-project, and sector type to use for data exchange. Map Quadri feature types to Tilos activity templates, and map Quadri task and Tilos activity properties to each other.
- Installation - Install the Quadri Connector and Quadri Task Templates.

Green, yellow, and red icons indicate the status of your settings and connector/template installations.



3. Click Settings. In the Quadri Connection Setup dialog, enter the settings required to connect your Tilos project with Trimble Quadri:



- Time zone - Select the region in which the linear construction project will take place.

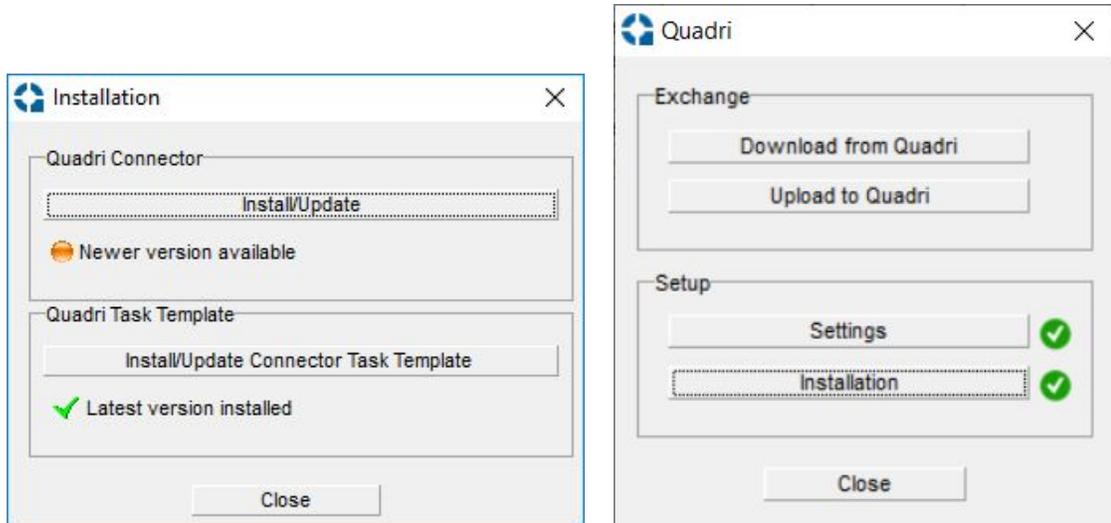
Note: Time zone is not required, but recommended to make sure Tilos and Quadri times are in sync.

- Project - Choose the default project (shown in Explorer > Project Data > Sub-Projects) to select activities from when uploading to Quadri task features.
- Sector type - Creates a single activity from multiple Quadri features. Currently, the functionality will automatically create a Sector Profile that merges several features into one Tilos activity. For this sector profile, you need to specify what kind of Sector type you want to use as the default.

4. Click OK. You will return to the other buttons after retrieving data from Quadri.

Install/Update the Quadri Connector and template

- Click Installation and then each button to install the required exchange files. Click Close when you are done and confirm the green check marks.



- Install/Update Quadri Connector - You can still work even if your version is not the latest.
- Install/Update Connector Activity Template - You are not notified if a newer version is available.

Download and map feature data from Quadri

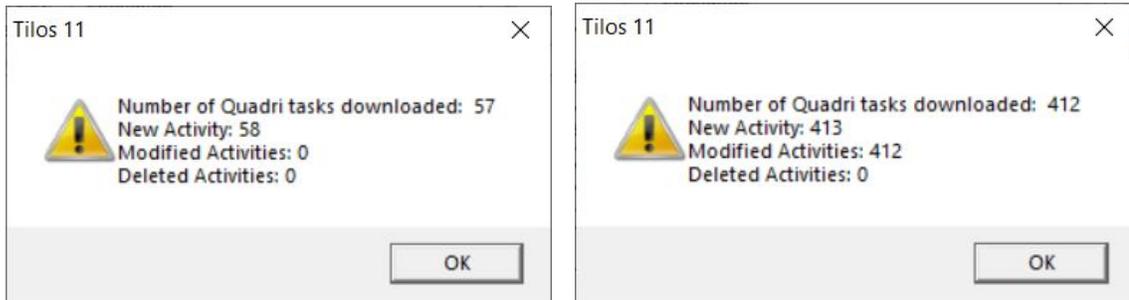
- Click Download from Quadri to get the available Quadri activities. If multiple are available, you are prompted to choose the right one. Select the Quadri task you prepared for Tilos.



Note: For Tilos to know which Quadri model to download from, Quadri has to be running with the model open on your computer at the same time. Within the workspace of the Quadri application, you can have multiple models, but only one can be current (active) at a time.

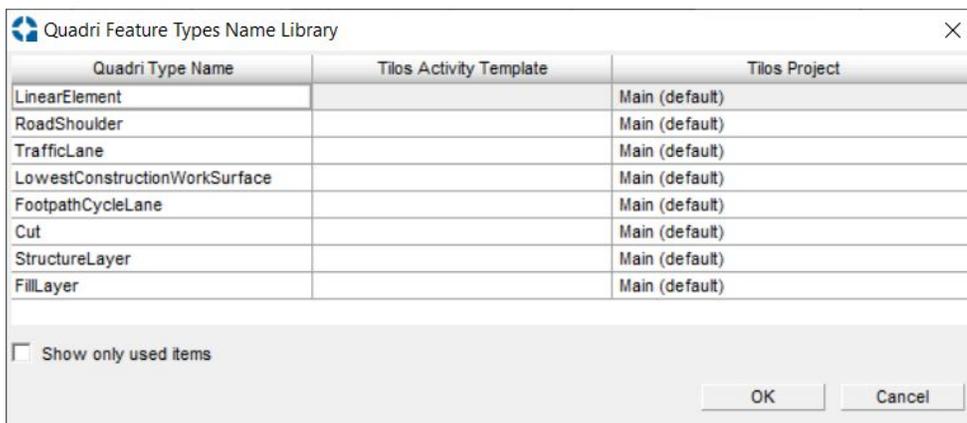
You will get a confirmation message of the downloaded Quadri data. The first time you download, only New Activity data is downloaded. As you make changes, you will

see Modified and Deleted Activities.

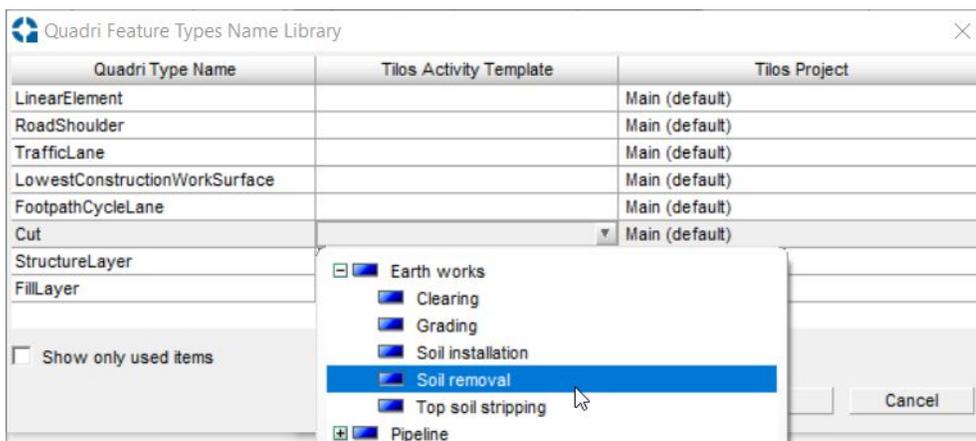


Now you can return to the Quadri Connection Setup dialog to confirm feature type and property mappings.

2. Click Settings again, and click Quadri Feature Type Setup. You will see feature types from your open Quadri model.



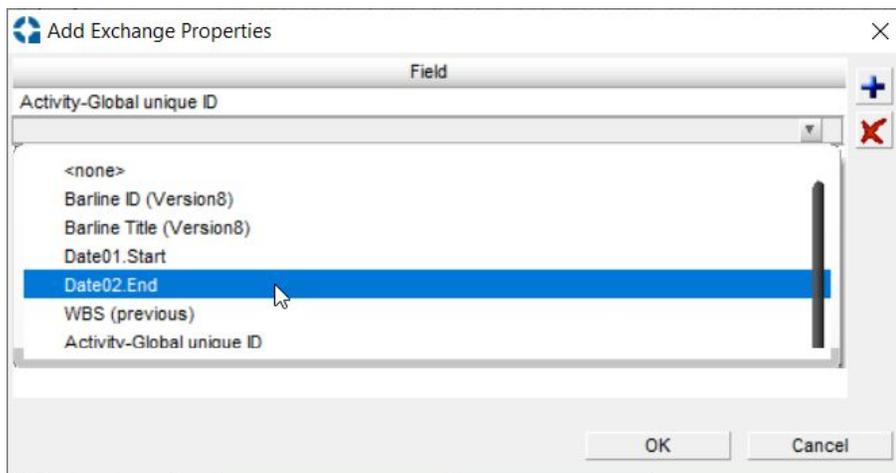
3. Click in each row and select an activity template to map the Quadri feature type to. If you have a lot of data, you can reduce the list by checking the Show only used items box.



- o Quadri Type Name - This column is automatically populated based on Quadri feature type names. Newly imported types will be updated.

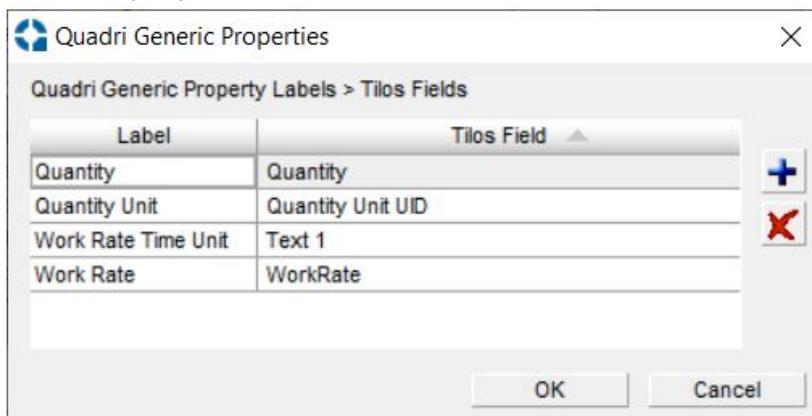
- Tilos Activity Template - Assign a Tilos activity template to each Quadri type.
 - Tilos Project - Select a project. If you do not, the default project is used and the activity is created without an activity template, but you will have to specify all activity details manually.
 - Show only used items - Filter the list to just data used in your project.
4. Click OK and then Add Exchange Properties to add/remove fields for any additional Tilos activity properties you need/do not need, including custom fields.

Click the  Add icon and then the drop-down arrow (or start typing) to see a list of available properties.



5. Click OK and then Manage Generic Properties to add/remove and map Quadri properties to Tilos properties, e.g., Volume = Quantity.

Click the  Add icon and then the drop-down arrow (or start typing) to see a list of available properties.

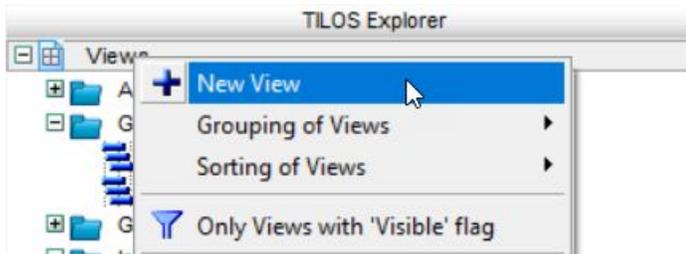


- Label - Type an identifier for the property as you want to see it in Quadri.
- Tilos Field - Click the drop-down arrow to see a list of available properties.

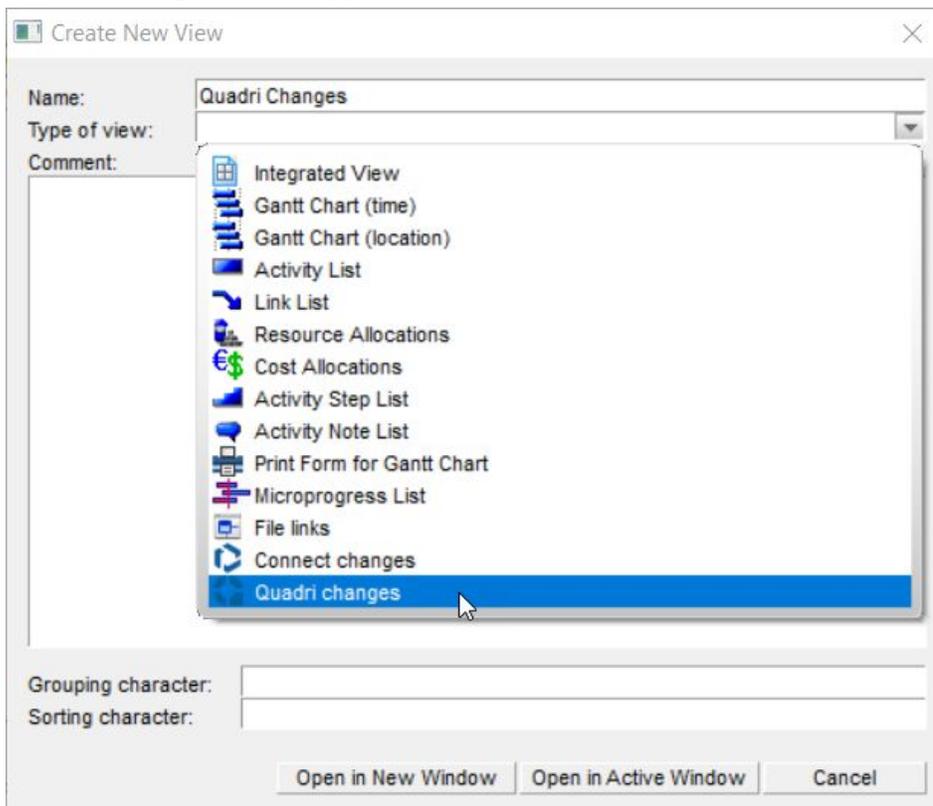
6. Click OK and then Close.

Create a view and review the exchange data

1. In the Tilos Explorer, right-click Views and select New View.

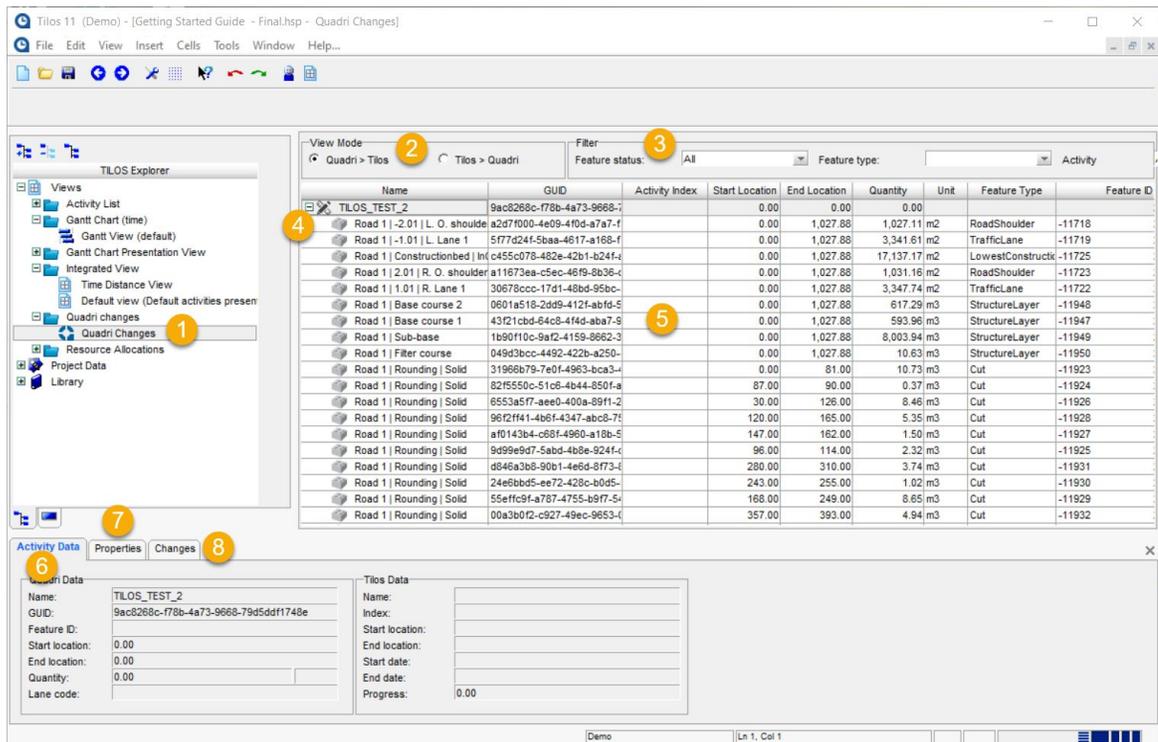


2. In the Create New View dialog, enter a name such as Quadri Changes, and select Quadri Changes in the Type of view list.



You can create multiple views, just as you do for activity View, Gantt Chart, etc. Each view's settings are independent with regards to the View Mode, Filter Status, Feature Type, and Assignment filters (described below).

- Click Open in New Window. In the Tilos Explorer, notice Quadri Changes under Explorer > Views. (1 below)



- In the view, confirm the Quadri > Tilos option at the top of the view (2 above) to see the list of activities created or modified in Quadri.
- Use the Filter options (3 above) to cull the list by:
 - Feature status (All, New, Deleted, or Modified (in Quadri))
 - Feature type (e.g., Cut, Fill layer, Linear element, Traffic lane, Road shoulder, Lowest construction work surface, Structure layer, etc.)
 - Assignment
 - All - Show all downloaded features, regardless of whether they have been associated with a Tilos activity or not.
 - Assigned - Show only features that have been assigned to a Tilos activity.
 - Unassigned - Show only unassociated features that are ready to assign to Tilos activities.
- Click + (4 above) next to the top-level feature in the table to expand all of the sub-features.

7. To see details about any sub-feature, select its row (5 above) in the table, and click each of the Activity Data, Properties, and Changes tabs on the Object Properties Toolbar. In the table, some columns are fixed. You can add others via Tools > Data Exchange > Quadri > Settings > Add Exchange Properties dialog. If you noted the unique feature ID in Quadri, it will be easier to find specific data.

Name	GUID	Activity Index	Start Location	End Location	Quantity	Unit	Feature Type	Feature ID	
Road 1 Rounding Solid	96f2ff41-4b6f-4347-abc8-75c7528aa817		120.00	165.00	5.35	m3	Cut	-11928	-11704
Road 1 Rounding Solid	55effc9f-a787-4755-b9f7-549511f109e7		188.00	249.00	8.65	m3	Cut	-11929	-11704
Road 1 Rounding Solid	24e6bbd5-ee72-428c-b0d5-52f802e8ac7d		243.00	255.00	1.02	m3	Cut	-11930	-11704
Road 1 Rounding Solid	d846a3b8-90b1-4e6d-8f73-884b17e0ffdc		280.00	310.00	3.74	m3	Cut	-11931	-11704
Road 1 Rounding Solid	00a3b0f2-c927-49ec-9653-0718fada6383		357.00	393.00	4.94	m3	Cut	-11932	-11704
Road 1 Rounding Solid	e5c8abeb-24fd-44a7-8802-a5763268423c		410.00	414.00	0.08	m3	Cut	-11933	-11704
Road 1 Rounding Solid	0f243af3-b607-456e-b8ff-abdbbc22c8e		423.00	426.00	0.30	m3	Cut	-11934	-11704
Road 1 Base course 1	43f21cbd-64c8-4fd4-aba7-9235dacaaa38		0.00	1,027.88	593.96	m3	StructureLayer	-11947	-11704

(6 above) Activity Data tab shows the basic properties of the Quadri feature. This shows what Quadri and Tilos data are connected/assigned. If an object is deleted in Quadri, Tilos shows how the deleted object is replaced by a new one; shows you the object at the same location, but with a new GUID so you can connect to the new item. This prevents you from losing a Tilos activity just because something has changed in Quadri; you can reconnect/remap the activity.

Activity Data
Properties
Changes
✕

Quadri Data

Name: Road 1 | Rounding | Solid

GUID: d846a3b8-90b1-4e6d-8f73-884b17e0ffdc

Feature ID: -11931

Start location: 280.00

End location: 310.00

Quantity: 3.74 m3

Lane code: H00#VO6

Tilos Data

Name:

Index:

Start location:

End location:

Start date:

End date:

Progress: 0.00

Review the Quadri data:

- The GUID is used to compare objects after updating.
- Start and End Locations show the Locational attributes you set in Quadri.

(7 above) Properties tab shows the generic properties you set up in Quadri. Shows all the custom properties created in Quadri. This is the same as Generic Properties described above.

Activity Data
Properties
Changes

Name	Value	Assigned Tilos field
Quantity	1200	
Quantity unit	m3	
Work rate	60	
Work rate time unit	h	

(8 above) Changes tab shows all modifications made to the feature over time.

Activity Data	Properties	Changes
2021-02-25 14:35	[Reflink Id]	-> -11704
2021-02-25 14:35	[Lane Code]	-> H00#VO6
2021-02-25 14:35	[Feature]	-> -11931
2021-02-25 14:35	[QuantityUnit]	-> m3
2021-02-25 14:35	[Quantity]	0.00 -> 3.74
2021-02-25 14:35	[Phase]	-> ENUM:119115
2021-02-25 14:35	[Type Name]	-> Cut
2021-02-25 14:35	[End Location]	0.00 -> 310.00

8. Click any activity that is highlighted (using the Highlight activity 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 Changes tab.
9. In the Tilos Explorer, expand Views > Activity List and open the Activity list. Here you can accept the changes to the activity as needed.

Assign Quadri features to Tilos tasks

1. To create a connection, select one or more feature rows in the table, right-click and choose an option for creating Tilos activities (that appear in the Activity List):
 - a. Create Single Activity (each from single feature) - Create a single Tilos activity from a single Quadri Features. This can also be used with multi-select. [Create a Tilos activity identical to the Quadri feature.](#)

Unit	Feature Type	Feature ID	Reflink ID	Creation Date
				17.02.2021 19:16
2	TrafficLane	-11719	-11704	17.02.2021 19:16
2	TrafficLane	-11722	-11704	17.02.2021 19:16

Create a single activity (each from single Feature)

Create multiple activities (split a single Feature)

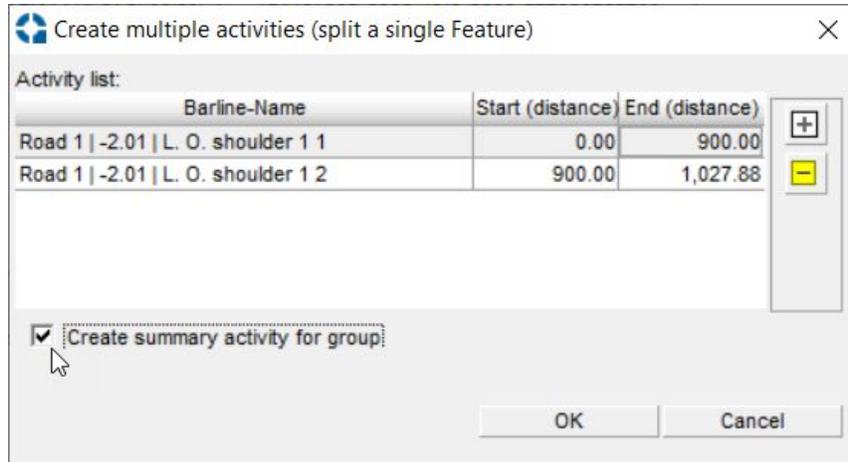
✗ Remove row(s) from table

✎ Edit View

Expand / collapse ▶

Incremental search

- b. Create Multiple Activities (split a single feature) - Open the Create Activity Group dialog to create multiple Tilos activities from one Quadri feature. In the dialog, you can specify how to split the feature; but the activities must match the full location of the feature (start and end location must match and cover the entire feature's span). This option also allows you to create it as a summary activity.



This creates a single Tilos Activity for each split. Quantities are also split and re-calculated according to the distribution distance.

- c. Create Single Activity (from multiple features) - This option (which is available when you multi-select several rows) creates one Tilos activity from a selection of multiple Quadri features. All quantities are automatically summarized.

Note: The current implementation does not check or validate that the selected features are of the same feature type.

- d. Create Group Activity - If you multi-select features, you can assign many features to one Tilos activity. This requires the Sector type specified in Quadri Connection Setup because if you create one Tilos activity out of multiple Quadri features, you create the profile for every feature in the group. The group will base the start and end locations on the smallest and largest stations of the multi-selected features. And the quantity and profile from the selection.
- e. Remove row(s) from table - Removes all selected rows from the view.

Note: All created Tilos activities are not deleted; they remain intact, but the link to the source feature is removed, disabling the possibility to update any changes made to the originating feature later.

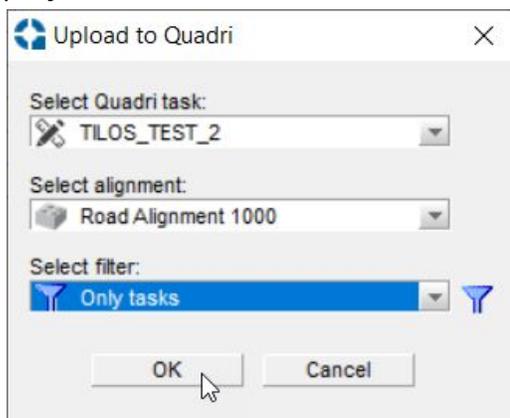
- f. Edit View - Disregard this menu item.
2. Review the new activity in the Activity List. It should use the activity template that you mapped to the Quadri Feature Type the activity is based on.
 3. Verify that the Tilos properties map to a Quadri feature's generic properties. You set this up in the Add Exchange Properties dialog above. To display these custom fields shared by Tilos and Quadri:

- a. Select an activity in the Activity List.
- b. Click the Details tab in the Object Properties toolbar.
- c. Click the  Custom Activity Fields icon on the right.
- d. In the Custom Activity Fields dialog, check boxes in the Display column for each of the generic properties you mapped from Quadri.

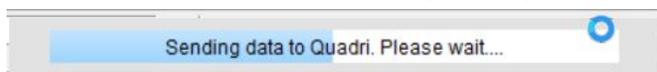
Synchronize data between Tilos and Quadri as you make changes

As scheduled activities and progress change, push the new information (activities and files) from Tilos to Quadri.

1. After you make changes to activities, dates, or progress in Tilos, select Tools > Data Exchange > Quadri, and click Upload to Quadri. You do not need to save your project first.



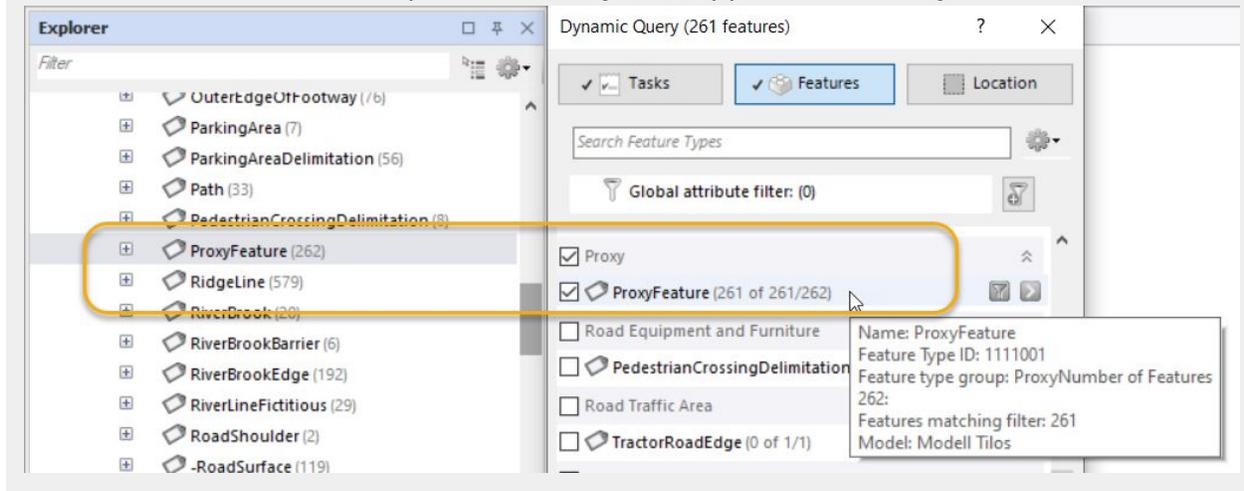
2. Select the Quadri task you want to update with Tilos activity data.
3. Select an alignment to define the position on the road (or other linear feature) for the activity.
4. Select a filter to restrict which activities are included in the upload.
5. Click OK. Do not close the dialog during the upload.



Steps in Quadri

1. Return to Quadri to verify the task schedule updates in the model features there.

Note: In this release, these updates will only be mapped to the Proxy feature.

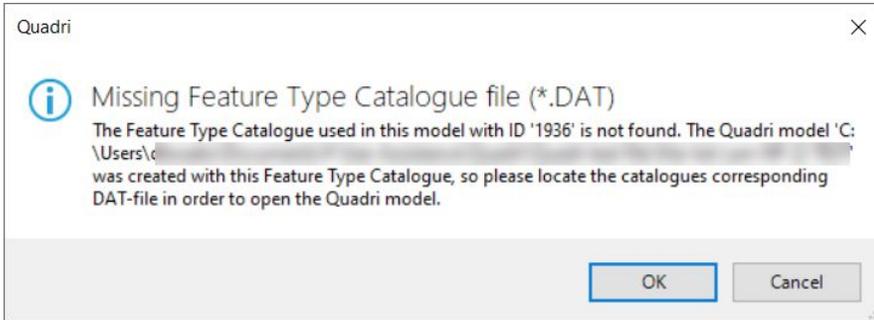


Supported Scenarios

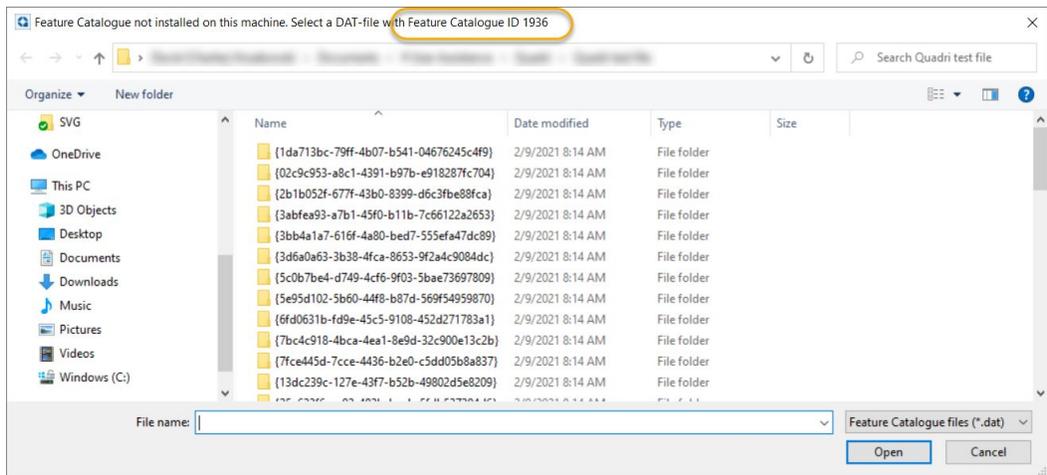
- Can a Tilos project connect to multiple Quadri model?
 - Yes
- Can multiple Tilos projects connect one Quadri model?
 - Yes

Troubleshooting

- Problem:
You receive this message when trying to open



- Possible cause/solution:
In the dialog titled "Feature Catalogue not installed on this machine. Select a DAT-file with Feature Catalogue ID <number>" browse to the numbered .dat file in
C:\Program Files\Trimble\Quadri\2020\Configuration\Default\FeatureCatalogues



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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