



White Paper

Multi-user Collaboration with Revit Worksets

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Starting Your First Multi-user Project

On many building projects, designers work in teams with each assigned a specific functional task. This involves simultaneously working on and saving different portions of the project. This document will give you important information to ensure your success using the Autodesk® Revit® building information modeling system on large projects with many team members.

Autodesk Revit Worksets

What are Worksets?

Autodesk Revit projects can be subdivided into Worksets. A Workset is a collection of building elements (such as walls, doors, floors, stairs, etc.) in the building. In Revit 6, users have the option of checking out entire worksets or individual elements in a workset. All other team member may view these elements or Worksets, but are unable to change them, preventing possible conflicts in the project. In this manner, Worksets function similarly to External References (xrefs) in AutoCAD® software, but with the additional ability to propagate and coordinate changes between users.

Team members adding and changing elements in Worksets can save their work to a local file on the network or their own hard drive, and publish work to a central file whenever they choose. They can update their local files at any time with the latest changes other team members have published. This ability to 'reload,' to see changes, is similar to the xref workflow.

Worksets are optimized to support teams working on a single building. For projects involving multiple structures arranged in a campus like manner, Autodesk Revit Model Linking functionality should be used to link a set of distinct RVT files. Each individual building can then be organized with its own Worksets.

What Happens When I Share My Project?

To start using Worksets, you first enable project sharing by choosing Worksets from the File menu in Autodesk Revit. The first time you choose this option, Autodesk Revit will display a dialog screen allowing you to set up the initial sharing of the project.

After your project is shared, each building element in the project is contained in exactly one Workset. Any modeling element can be moved to a different Workset by changing the Workset property in the Properties dialog box.

When you are working on a shared project, you specify an *Active Workset*. Newly created model elements are placed in the active Workset. Elements specific to a view such as annotations and dimensions are automatically placed in the view Workset of the current view.

When Worksets are first enabled for a project, the following Worksets are created automatically:

- **Views:** For each view, a dedicated view Workset is created. It automatically contains the view's defining information and any view-specific elements such as text notes or dimensions. View-specific elements cannot be moved to another Workset.
- **Family Worksets:** one for each loaded family in the project
- **Project Standards Worksets:** one for each type of project setting--Materials, Line Styles, etc.

- **Shared Levels and Grids:** user-defined Workset that initially contains grids and levels existing at the time the project is shared
- **Workset1:** user-defined Workset that initially contains everything not included in the other Worksets.

You can change the names for Workset1 and Shared Levels and Grids at any time. View, Family, and Project Standards Worksets may not be renamed. Elements and settings in your project move to these Worksets in the following ways:

Usually, you will want to create several Worksets besides Workset1 into which to put the modeling components that make up the building. See *Things to think of when planning projects* below for guidelines on what Worksets to create, and in what Workset to place each component in order for work to proceed as smoothly as possible.

How Do I Save My Work Once the Project is Shared?

After your project is shared it can support multiple users. Users exchange their work by saving to a special file called the **Central File**. This file is created automatically the first time you save the project after sharing it. Autodesk Revit recommends that you not work in this file unless you are the only user working on the project. Only one user can directly edit the Central file at a time. For multiple users, the Central file acts as the distribution point for publishing work to the rest of the team. Before your team can work simultaneously on a project, you must create a Central file. See *What is the Central file and how do I create it* below for instructions.

All users should save their own local copies of the Central file. You can create a local copy by doing the following;

- Open the Central file.
- Choose **Save As** from the **File** menu.
- In the **Save As** dialog box, give the file a name and directory location.

When you create or open a local file of a shared project, you will be able to save two ways:

- **Save** – This saves changes to your local file for safekeeping before you publish it back to the rest of team. Use the save reminders available in Autodesk Revit to make sure your work is saved regularly.
- **Save to Central** – This publishes work by saving your changes back to the Central file. All other team members can then see your changes by selecting **Reload Latest Worksets** from the **File** menu. If the Central file has changed since you last saved, Autodesk Revit will automatically reload the latest versions of your team's Worksets when you save to central, and display which Worksets are being updated. Be sure to save your local file after you have done a save to Central to ensure that the local and central files are in synch.

When a shared file is first saved, it creates a directory with your project name followed by "_backup". This directory contains the backups for your central file. Backups are recorded on a per-Workset basis. Backups for a Workset are created only when that Workset changes. This requires much less disk space than saving the entire project each time. Do not delete or rename these folders or files or you will not be able to get to your backups.

What is the Central File and How Do I Create It?

The Central file is created the first time you save the project after sharing it. This file stores the current ownership information for all the Worksets in the project.

Only one user can directly edit the Central file at a time. For multiple users, the central file acts as the distribution point for publishing work to the rest of the team. All users should save their own local copies of the file, work locally, and then save changes back to the central file for other users to see their work.

Tip: Before sharing your project, the Central file should be at a point where more than one person needs to work on it at the same time

Creating a Central Location File for your project

- Open an Autodesk Revit project and enable project sharing by choosing **Worksets** from the **File** menu.
- An explanation dialog box appears showing the default Workset names. If desired, rename the Worksets and click **OK**. The **Worksets** dialog will be displayed showing the effects of your changes. Click **OK**.
- From the **File** menu, choose **Save As** or **Save**.
- In the **Save As** dialog box, give the file a name and directory location. Choose the 'Options' button and ensure that the **Make this the Central location after save** option is automatically selected. This option is always automatically selected for the first save after Worksets have been enabled.
- Click **Save**.

The project now has a Central file. Remember, only one user can directly edit the Central file at a time. It is not a good practice to work in the Central File, users should **Save As** to a local file and then publish their work back to the Central file.

Editing a Shared Project

After a project is shared, a user can only make changes to Worksets or Elements that are editable by that user. To make an Element or Workset editable, uncheck **Editable Only** on the options bar, right click to get the context menu and then choose **Make Element Editable** or **Make Workset Editable**. You can also **Make Elements Editable** from any error messages indicating that an element needs to be editable. To make a Workset editable, you can also use the Worksets dialog either from the Worksets command in the File menu or the Worksets icon in the Worksets toolbar. Select a Workset and choose the Editable button. Each Workset can only be owned by one user at a time. Borrowers or users with elements checked out from that workset are listed in the next column.

The Worksets dialog and the Workset toolbar also contain a box to specify the Active Workset, the Workset into which new modeling elements are placed. In Revit 6, the Active Workset no longer has to be editable.

To make a Workset non-editable, select the Workset in the Workset dialog and choose the Non Editable button. Elements that you have directly changed will be kept as borrowed. You can also change the editability in the Save to Central dialog.

Can I Move the Central File?

You can always move the central file, by following this procedure:

- Make sure all team members publish their work to the current central file location by choosing **Save To Central** from the **File** menu. This ensures that no work is lost as a result of changing the central file. When saving, have each team member relinquish their Worksets by checking all options to relinquish Worksets after saving

- Move the file to the new location using Windows Explorer. We suggest that you use move, not copy. If the old file is left behind, some team members may continue to work with it by accident.
- **Open** the file you just moved at its new location. You will get a dialog telling you that the central location is changing. Dismiss this dialog and continue.
- From the **File** menu, choose **Save As** to re-save the file over itself (using the same name and path), ensuring that you select the **Make this the Central location after save** option under the **Options** button.
- What you have now is a new central file with most Worksets not editable (some Worksets may still be editable by the current user). Since all the work has been published, each team member should create a new local file. Each user can do this by opening the new central file, making necessary Worksets editable, and then using **Save As** to make a new local file.
- If you discover that there is a local file with some work that was not published in time to the old location, you can publish it to the new location by choosing **Save To Central** from the **File** menu, specifying the new central file location through the **Browse** option. *You will only be able to do this successfully before any other changes are saved to the new central location.*

Note: The backup folder in the new location contains backups only for work done after the file was moved.

Can I Use the Central File to Start a New Project?

If you want to create an independent copy of the central file, open the original, then **Save As** to a new location. Check **Make this the Central location after save** option under the **Options** button. This new file will not exchange information with the original.

Element Borrowing

New in Revit 6, you can borrow elements from worksets that you do not have editable. Element borrowing is a process of making elements editable on the fly by obtaining permission from either the central file or users who own those worksets. On attempting to make an element editable, Revit grants the request if no other user has that element editable. Otherwise it posts a message saying you must seek permission from the user who has the workset editable. Users can grant or deny requests in the Editing Requests dialog. In Revit 6, you must notify the user of requests via email or instant messenger. The other user does not receive any automatic notification of your request.

Adding Elements to Worksets

New in Revit 6, you can add things to any Worksets without making the Workset editable. These newly added elements can be modified until you save them to the central file (Save to Central). Once an element has been saved to the central file, you can't change it without making it or its Workset editable. Additional examples of things you can do without editability:

- You can create new types (floor, roof, wall, component, etc.) from the Properties dialog box. You can also add view-specific elements, such as dimensions.
- You can edit the newly created types in the Properties dialog box, however, once the changes have been saved to central, the properties of the newly created types are no longer editable until the corresponding Project Standards Workset is editable.

- Existing types in the project cannot be modified unless the corresponding Project Standards Workset is made editable.

Use the Make Elements Editable buttons from error messages to make specific Project Standards Worksets (i.e. individual Materials or individual wall types). Use the option to relinquish Project Standards, View, and Family Worksets when saving to central to assure that these Worksets are available to others on the project.

Finally, we recommend that you do not check out Project Standards if you will be working off the network or on a portable computer at a remote location.

What is Special About the View Worksets?

In Autodesk Revit, every view generates a special Workset containing the view's defining information and all elements specific to that view.

- Unlike user-created Worksets, view Worksets cannot be made active since Autodesk Revit controls what information they contain.
- Since each view resides in its own Workset, interference is minimized. One user's view changes will not affect any other user.
- View-specific elements are placed in the correct View Workset regardless of the current active Workset. This helps maintain correct project organization and avoids wasted time.
- View Worksets can be made editable using an option in the context menu in the Project Browser, or from right-clicking on view-specific elements, as well as from the Workset dialog.

Selective Open

You can select which Worksets are open or closed. Elements in Closed Worksets are not displayed in any view. Therefore, you can improve the display-related performance of Autodesk Revit by opening only those Worksets required for your work.

You can close or open Worksets at any time. In an open file, use the Worksets dialog, select Worksets to open or close. Use the "Open" and "Close" buttons to change their status. When opening a file, select an option in the "Open Worksets" box to control which worksets are opened.

- "All" opens all worksets.
- "Specify" opens user-selected worksets.
- "Last Viewed" opens worksets that were open when file was last closed.
- "Editable" opens all worksets editable by you.

All Worksets editable by you must be opened.

Things to Think About When Planning Projects

Creating New Worksets

As a project evolves, it may be necessary to add worksets in order to provide the maximum flexibility in usage and minimize interference between members of the project team. Worksets can be created at any time using the New option of the Worksets dialog. They will become available to the project team as soon as the user who created them makes a Save to Central. In Revit 6, with the ability to make elements editable, it may seem unnecessary to make more than one workset at all, but there are still several compelling reasons listed below.

General Considerations

Decisions made when sharing a project and setting up its Worksets can have long-lasting effects on the project team. AutoCAD users will recognize some of these implications from setting up xref structures for projects. In general, when setting up Worksets you should take several considerations into account:

- Project size
- Team size
- Team member roles
- Default Workset visibility

Long-term performance of the project can be maintained more easily if Worksets are planned appropriately and used correctly. Establishing practical policies on how all team members access and create new Worksets in the project will maintain performance for existing users and ease the process of introducing new team members to the project.

Project size: The size of your building may affect the way you decide to segment the Worksets for your team. Unlike AutoCAD xrefs, you don't need to make separate Worksets for each floor of the building. You will want to separate the project into Worksets that allow team members to work without interfering with each other. In a multistory structure you may want to create separate Worksets for a set of building elements that will only appear on one floor, such as a tenant interior. If the project's floor plate is large enough that you will need to split it with match lines to fit it on sheets, you may want to consider creating separate Worksets for each portion.

Team size: The size of the team at the time you enable project sharing will affect how you structure the project's Worksets. You should have at least one Workset for each person, not including the **Project Standards, Shared Levels and Grids, and View** Worksets. In most projects, greater subdivision will improve workflow by reducing interference between team members.

Autodesk Revit is designed to allow a single designer to work up a concept, and then share the file to add members to the team. As more people join the team to finish the detailing and documentation, you can create new Worksets for their use.

Team member roles: Typically, designers work in teams with each assigned a specific functional task. It makes sense to subdivide the project based on these task roles. This way, each team member has control over his or her portion of the design, and uses Autodesk Revit to coordinate changes among the various design portions. A typical scenario for a multi-story commercial building is shown in the figure to the right. Note the various functional roles listed.

Name	Editable
Casework	No
Electrical	No
Entrance and Lobby	No
Furnishings	No
Interior Partitions - Level 1	No
Interior Partitions - Level 2	No
Laboratory Equipment	No
Plumbing	No
Shared References	No
Shell - Core	No
Site	No

Finally, as new team members create Worksets for their own use, make sure visibility defaults are set appropriately.

Default Workset visibility: Once a project has been shared, the View Visibility/Graphics dialog gets another Tab that lets you control which Worksets are visible in a view. If you are sure that the elements of a particular Workset should not appear in a particular view, it is a good idea to turn off visibility of that Workset in that view. This allows Revit to display the view faster, because Revit does not need to figure out if any of the elements in that Workset should be displayed.

When you create a new Workset, you are given an option that controls whether, by default, the new Workset will be visible or invisible in each view. You can still change the visibility in each view individually using the View Visibility/Graphics dialog.

To set visibility correctly, determine whether the elements in the Workset will be displayed on many deliverables or only a few. Under this guideline, you might have an *Exterior* Workset be visible by default, while a *Furniture-3rd floor* would not be. The elements from *Exterior* would be visible in many plans, sections, and elevations. Items from *Furniture-3rd floor* might only be visible on one furniture plan.

Long-term performance is improved if Worksets added are not visible by default unless they need to be. Team size usually increases as projects progress from design to documentation stages. As new team members create Worksets for their own use, the Worksets they add often won't need to be visible by default.

Another way to achieve the performance effects of limiting visibility is by using Selective Open with Worksets.

With **Element Borrowing**, it may seem unnecessary to create more than one workset. Consider these additional reasons when creating workset in Revit 6:

- Convenience of making a whole section of the project editable
- Work on Rooms
- Visibility control using 'selective open' / linking
- Performance

Convenience of making a whole section of the project editable: Dividing a project into worksets makes it easier to make whole sections of a project editable at once.

Work on Rooms: Room elements can be difficult to access. They can only be made editable individually by the Make Elements Editable button on error messages. It is often easier to put rooms on one workset and then make that workset editable when you want to edit the rooms.

Selective open/ linking: Worksets are a convenient way to control overall visibility in a project. Closing a workset can significantly save display time. Similarly, specific worksets can be linked into other .rvt files. It is often convenient to leave out certain worksets such as Shared Levels and Grids when linking one file to another so that you do not have to turn off levels and grids individually in each view.

Performance: As a general rule, elements likely to be edited together (e.g. walls and windows) should be in the same workset together; elements not likely to be changed together (e.g. furniture and walls) should be in different worksets. When a file is saved to central, every workset that contains any direct or indirect change is entirely re-written, therefore, a finer division of elements into worksets (perhaps east wing and west wing) can reduce save times.

Tips and Common Scenarios

Taking Your Portable Computer to a Remote Location with the Project

Users can work on the project when they are away from the office or otherwise unable to access the network location of the central file. The procedure for a user to take work to a remote location (such as one's home) on a portable computer is:

- Make the needed Worksets editable while still at the office and on the network.
- Work on the project at the remote location proceeds as it would in the office. Elements in editable Worksets can be modified and new elements can be created in any editable Workset. (New elements can also be created in any View or Project Standards Workset, even if they aren't editable.)

If you realize that you need to modify Worksets that you do not have editable, you can make the Workset **Editable at Risk**. In this situation, you will *not* be able to save your changes back to the central file if another user has changed the same element that you have and published his changes back to the central file. In that situation, you will lose *all* changes. You will also not be able to save your changes back to the central file if the Workset is Editable by another user; in that case, that user can relinquish Editability and you'll be able to save your changes unless he or she has changed any of the same elements that you have. In that case also, *you* will lose *all* changes.

Since making a Workset Editable at Risk carries a high risk that work will be lost it should only be used if:

- You do not intend to save your changes back to the central file, or
- You are very confident that no other user will make that Workset editable. If you have a colleague who is in the office with access to the central file, you may want them to start a session of Autodesk Revit using your name as the User Name and make that Workset editable. This will guarantee that no other user can make it editable.

Editing a Workset "at risk" should be avoided whenever possible.

Multiple Users Working Remotely

Users can work remotely provided the remote users have high speed network access (through means such as a VPN) to the central file. Alternatively, a user can transfer (via Zip disk or other means) their local file to someone with network access, who can then publish changes back to the central file, reload the latest version from the central file, and transfer the updated file back to the remote user for continued work.

Users Making Presentation Renderings Remotely

While rendering remotely using AccuRender® is supported, we do not recommend it unless you understand the implications for the rest of the team. If you intend to render the model while away from the office, you will likely be changing material assignments and other project settings.

To do this, you will need to check out the Materials Settings Workset. This means that other users working on the project will not be able to change any materials, since you will be the only one who has the ability to edit that Workset.

Visually Distinguishing the Active Workset

To assist you in determining which workset is active and which elements are in it, there is a command that grays out all elements that are not in the active workset. This helps prevent you from adding elements to an undesired workset. To gray out elements in inactive worksets, click **Gray Inactive Workset Graphics** on the Worksets toolbar or select the **Gray Inactive Workset Graphics** check box in the Worksets dialog box. Temporary elements, such as temporary dimensions and controls, do not display in gray. The command has no effect on printing.

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