



100 OpenRoads Designer Introduction

OHDOT OpenRoads Training Configuration

This Ohio Department of Transportation training material is available for both internal and external users. This training guide is structured for ODOT's internal users with the training data located in the ProjectWise environment.

Training Guides

ODOT's training guides for ORD are available in the OHDOT CADD Standards. As these training guides are updated, the current version can be found in the following folder:

For an installation of the OHDOT CADD Standards within ProjectWise:

```
Ohio DOT Projects\Documents\03 Standards\CONNECT_Config\WorkSpaces\OHDOTCEv01\Standards\OHDOT Utilities\Training\OpenRoads\ORD Design\
```

For an installation of the OHDOT CADD Standards external to ProjectWise:

```
..\OHDOT\Standards\OHDOT Utilities\Training\OpenRoads\ORD Design\
```

The training guide is modular in approach, with each topic presented in individual documents. This allows ODOT to easily update individual sections without impacting other sections.

Training Datasets

For external users, the files used in this training are available in the OHDOT CADD Standards. See the following document for more information:

```
...\OHDOT\Standards\OHDOT Utilities\Training\Setting up Training.pdf
```

The training manual is presented in a modular approach; however, the training exercises are sequential with each training example building off the previous exercises. Additional datasets, with the sample project partially completed in various states are appropriate for the exercises, is planned for a future update.

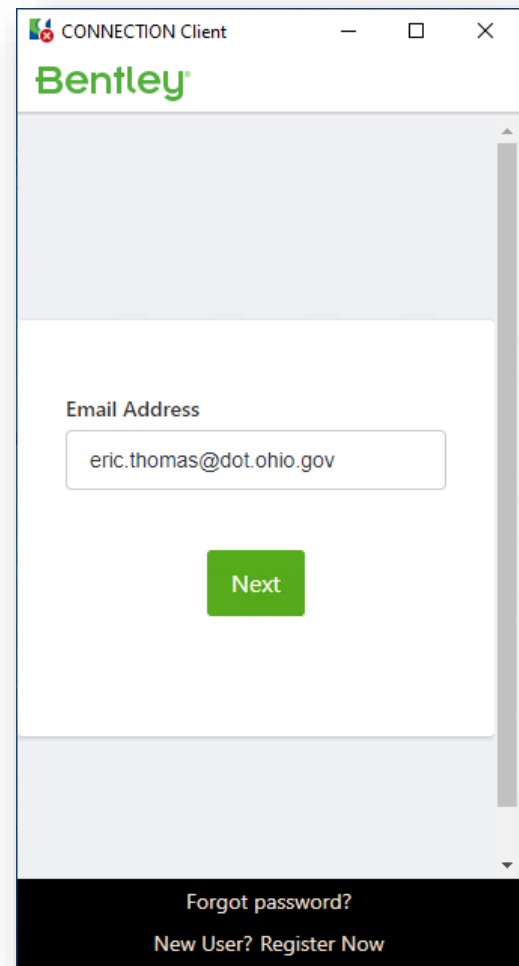


Bentley CONNECTION Client

Bentley Connect licensing requires user to log into their Bentley account to secure a software license.

ODOT users should log in using your ODOT email address. The password is automatically applied based on your ODOT credentials.

Contact your District CADD Administrator if you are unable to log into your Bentley account.





OpenRoads Designer Introduction

OpenRoads Designer (ORD) is Bentley's civil design software solution for surveying, drainage, subsurface utilities, roadway, and site design. ORD supersedes Bentley's previous design software packages InRoads, GEOPAK, MX, and Power Civil.

ORD contains all the functionality of MicroStation CONNECT Edition with the addition of Civil design capabilities.

ODOT will transition to ORD in the fall of 2019. All new projects started after January 1, 2020 are to be developed with ORD. The transition plan for ORD is documented on the ODOT website:

http://www.dot.state.oh.us/Divisions/Engineering/CaddMapping/CADD_Services/ORD-Transition/Pages/default.aspx

ORD/SS10 Compatibility

Many of the civil design and 3D modeling functions in ORD are identical in behavior and functionality to the OpenRoads tools that were available in previous Bentley civil design software offerings. However, the underlying technology has undergone significant enhancements and is not backwards compatible with the SELECTseries versions of InRoads, GEOPAK, MX, or Power Civil. Data can be exchanged between SS10 and ORD formats by use of XML files to export and import specific information. It is highly recommended that all users on the project, including any consultants or sub-consultants, are using the same software versions.

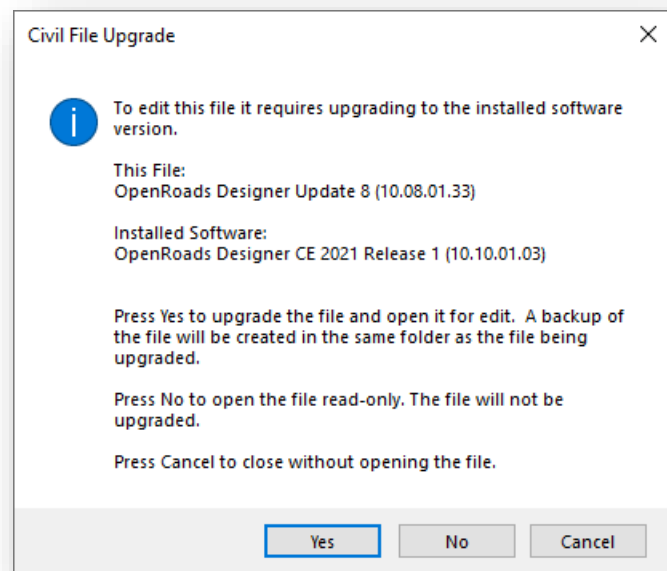
ORD Software Updates

Bentley's software updates alternate between major and minor revisions.

- Major updates are indicated by the second number in the version number. These updates include new software functionality that changes the underlying software schema. Major updates are not backwards compatible with previous versions.

In the example at right, a file that was last edited with OpenRoads version 10.08 is opened with version 10.10. Opening the file will upgrade the civil data to version 10.10. The file will no longer be editable in versions prior to 10.10.

- Minor updates do not change the underlying schema and do not require the file to be upgraded from a previous release with the same major version number.



As ODOT moves forward with software updates and the CADD Standards for ORD are updated, some of the updates to the CADD Standards will not be backwards compatible with prior versions of ORD due to changes to the schema. Therefore, it is important for both internal and external user of ORD and ODOT's



CADD Standards for ORD to stay up to date with the current version of the software that is in use with by ODOT.

The current ORD version that is in use by ODOT can be reviewed at the following web page:

http://www.dot.state.oh.us/Divisions/Engineering/CaddMapping/CADD_Services/Support/Pages/Software.aspx

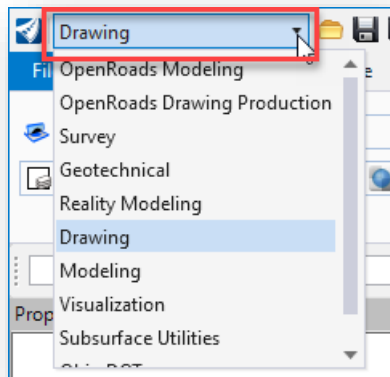
Ribbon Interface

ORD presents the user with a modernized ribbon interface, much like the various Microsoft Office products. Learning the ribbon is relatively easy but it will take a little time for users to get familiar with the new command layout.

The interface is organized by **WorkFlows**, **Tabs**, and the **Backstage**. Each is described below.

WorkFlows

The **WorkFlow** is selected by a drop-down menu in the upper left corner of the ORD interface.

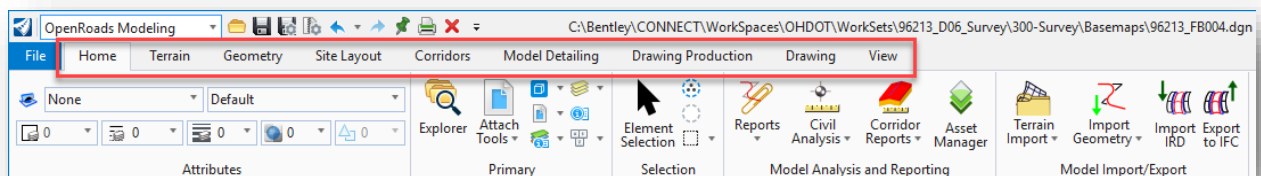


The **WorkFlows** present the various ORD commands logically organized according to a task. For example, the **Drawing** workflow contains command that are used for typical MicroStation drawing tasks.

Some of the most used drawing functions are available in the other workflows.

Tabs

When a **Workflow** is selected, the various commands are organized into **Tabs** like the example below.



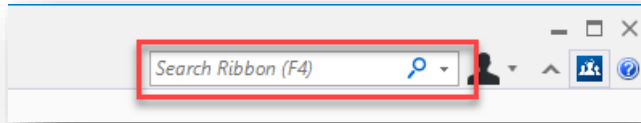
Each tab groups like commands into a logical organization of the various tools.

Note: Most **WorkFlows** contains a **Drawing** tab with commonly used MicroStation drawing tools.

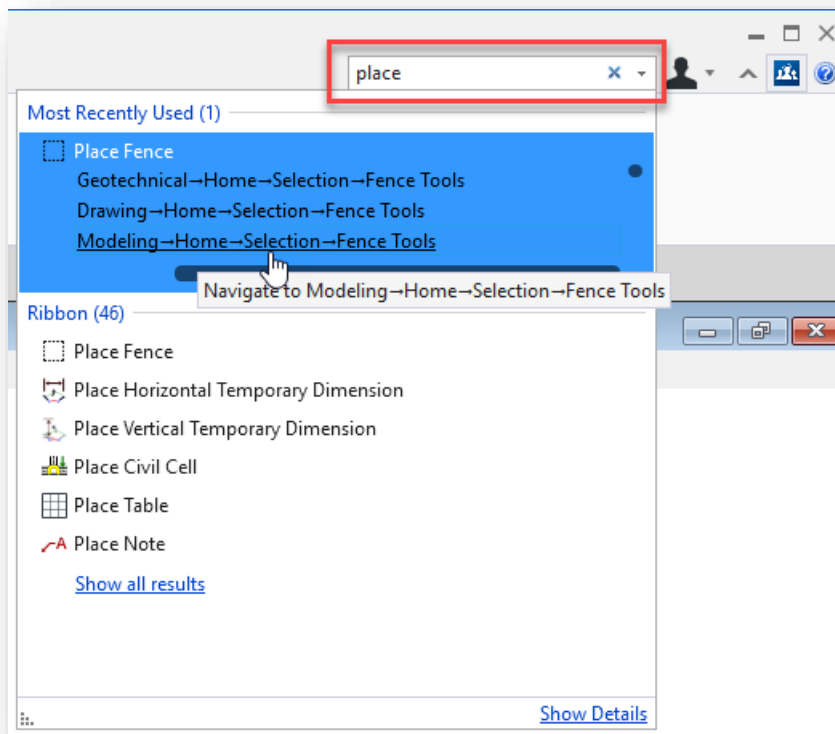


Search Ribbon

The **Search Ribbon** key-in field, which is located at the top-right of the ORD user interface, is useful to quickly find a desired command as you learn the ribbon interface without manually searching the ribbon.



As you key-in the name of a command, the Search Ribbon function will show a list of commands matching the text string as it is entered. An example is shown below.



Most Recently Used commands matching the key-in entry are displayed at the top.

Floating the cursor over one of the results will expand the item to list the various places in the ORD interface where the command can be found.

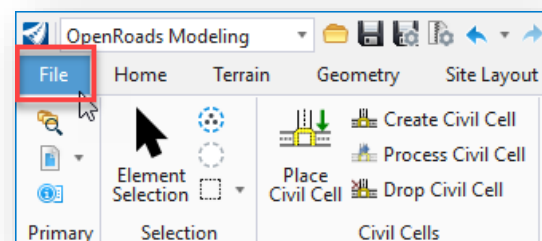
Click on the command name, without expanding the list, to run the command.

Click on the command location, with the list expanded, as shown at left, to navigate to the appropriate **Tab** in the ribbon.

BackStage

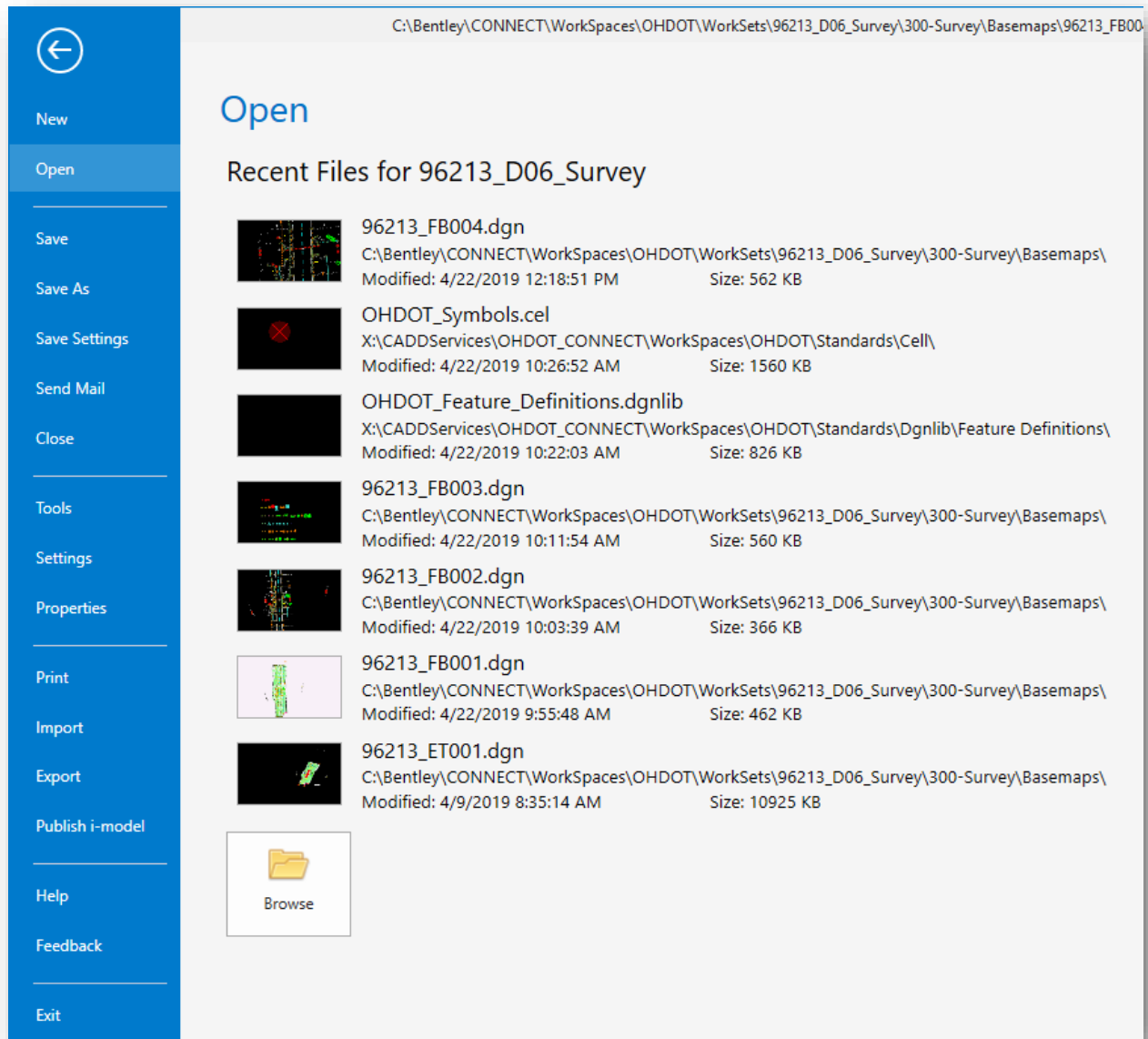
The ribbon contains command that are used for ORD and MicroStation related drawing and design tasks. Tools that are not command related, such as **Plotting, Design File Settings, User Preferences**, etc. are in the “**BackStage**” area.

To access the **BackStage**, select the **File** command at the upper left of the ORD user interface.





The **BackStage** has a list of commands at left, along with a list of recently opened design file, as shown below:



We will not cover all the functions available from the **BackStage** in this introductory class. Two of the most accessed functions are listed below.

User Preferences

User Preferences are accessed from the **BackStage** by selecting **Settings > User > Preferences**.

Design File Settings

Design File Settings are accessed from the **BackStage** by selecting **Settings > File > Design File Settings**.



ProjectWise

ProjectWise, Bentley's engineering project collaboration software, is used to manage, share, and distribute engineering project content. ProjectWise integrates with Bentley applications and other products including Autodesk software and Microsoft Office.

With the migration to OpenRoads Designer (ORD), all internal projects started using ORD will be housed in ProjectWise.

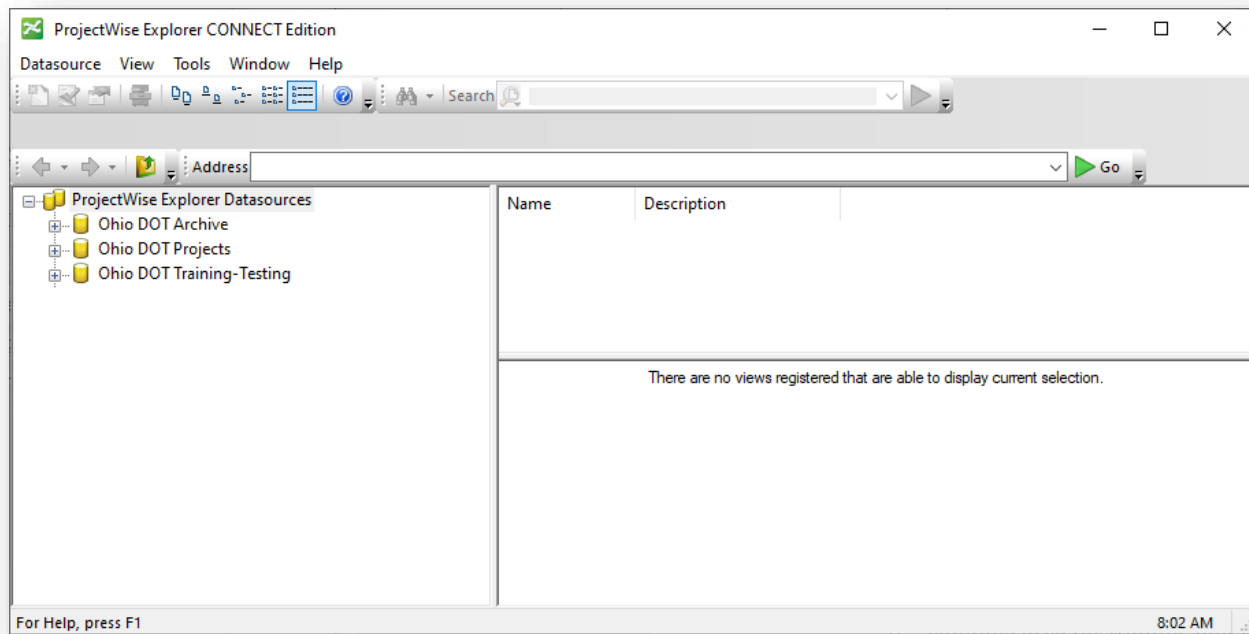
ProjectWise Explorer

ProjectWise Explorer is used to access project information stored in ProjectWise. The application is accessed using the desktop shortcut shown below.



Data Sources

ODOT's ProjectWise environment is configured with three main datasources as described below:

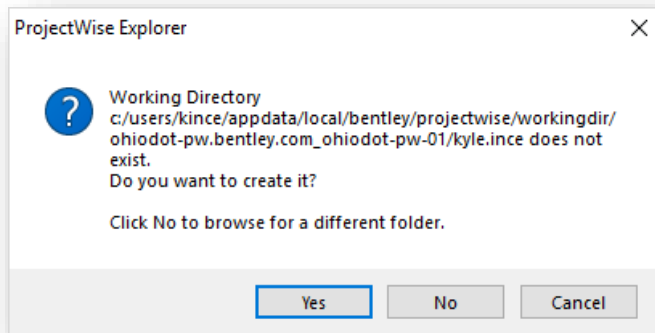


- Ohio DOT Archive
 - Read Only repository for completed plan sets
- Ohio DOT Projects
 - Active projects directory (directly replacing the “idrive”)
 - All ODOT Connect projects will be housed here
- Ohio DOT Training-Testing
 - Sandbox area for training and testing which mirrors the active projects directory



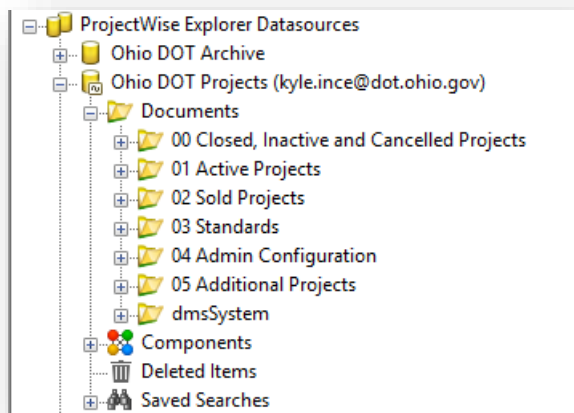
Select the datasource from the ProjectWise Explorer

- The first time you access ProjectWise on any PC, you will see the create working directory dialog.



- ProjectWise copies the working files to your local hard drive, called the Working Directory. It contains temporary copies of the document files that you checked or copied out from a ProjectWise server.

Ohio DOT Projects

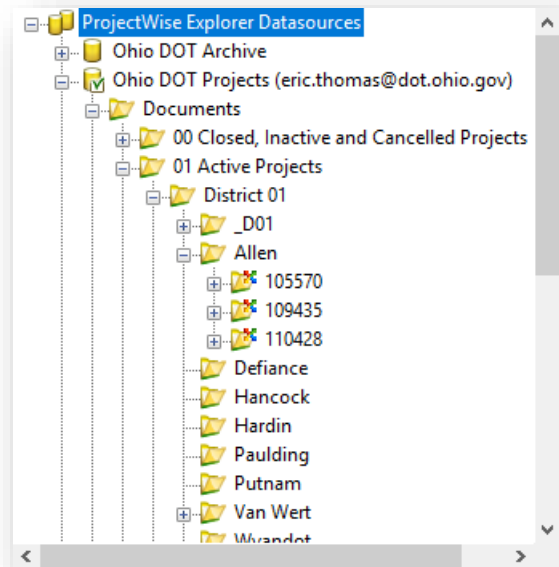


- 00 Closed, Inactive and Cancelled Projects*
 - Archive of project data that is completed, or cancelled
- 01 Active Projects
 - Active PID projects (replacement of the project data folder)
- 02 Sold Projects
 - Project Data location when project is in construction
- 03 Standards
 - CADD Standards, Help Documents, Templates, etc.
- 04 Admin Configuration
 - Access control models and other ProjectWise configuration documents
- 05 Additional Projects
 - Area where projects without a PID may be worked on using OHDOT standards



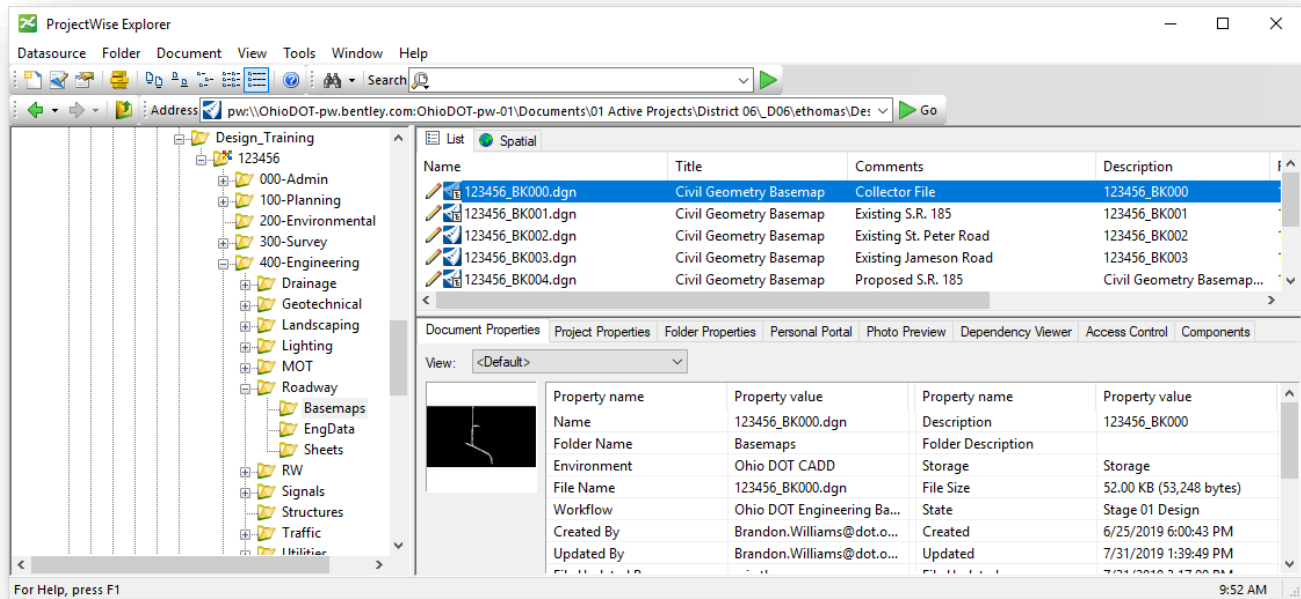
Active projects are organized by District, County, and PID as shown at right.

- The `_D##` folder is used for District-wide projects









Opening Files with ProjectWise

Files are opened by double-clicking on the file name in the *ProjectWise Explorer* dialog. The file is opened with the associated program. Right-click on a file name and choose **Open With** to select the default program for a given file type.





The icons to the left of the file name are described below:

	<p>File has Read/Write access</p> <ul style="list-style-type: none"> The user can check out the file for revisions. While the file is checked out locally, the file on the server is locked to other users.
	<p>File has Read Only access</p> <ul style="list-style-type: none"> This symbol means the user can read the file but cannot edit the file. The user can view the file but it remains available (and unlocked) to other users.
	<p>File is Checked Out by you (others see the Locked symbol)</p> <ul style="list-style-type: none"> A copy of the file has been sent to your local working directory for editing. The file remains locked to other users until you check the file back in.
	<p>File is Locked</p> <ul style="list-style-type: none"> The file is being accessed by another user (Checked Out or Exported) and is not available. Users can still open the file as Read Only.
	<p>File has been Exported by you (others see the Locked symbol)</p> <ul style="list-style-type: none"> Files are typically exported to a local folder and then worked on outside of ProjectWise. When finished, the files are then Imported back into ProjectWise.
	<p>File is in Final Status</p> <ul style="list-style-type: none"> No changes are allowed. This is an archived file status.

When a file is opened from *ProjectWise Explorer*, the file is copied to your local computer and is locked on the server. Other users can view the file but cannot edit the file while it is checked out by another user.

Changes to the file are not reflected on the server copy until one of the following actions is preformed:

1. The file is closed and checked back into the server using the **Check In** option
2. The server copy is updated by choosing **File> Update Server Copy** in ORD

Opening Multiple MicroStation Design Files

Double-clicking on a file name opens the selected file. By default, ProjectWise does not allow the user to open multiple design files simultaneously. If a MicroStation design file is currently opened, the software forces the user to close the current design file.

Multiple files can be opened with ProjectWise as follows:

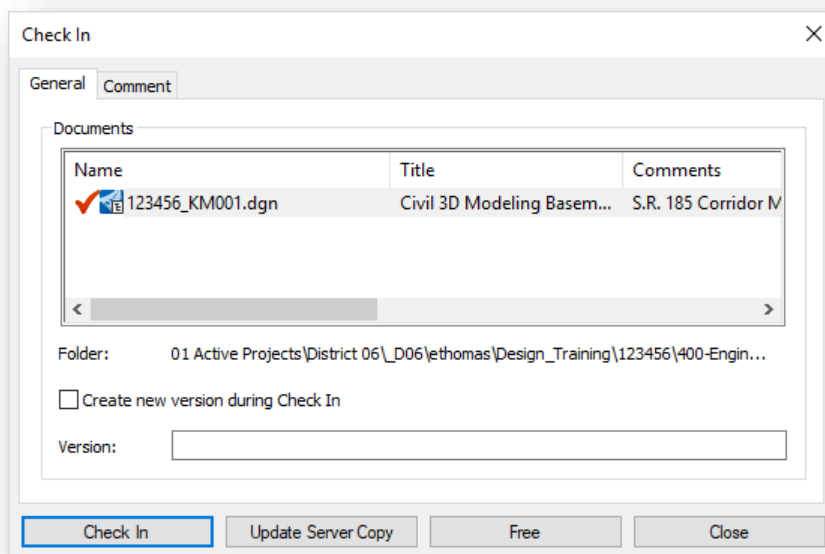
- To open a second file for write access (assuming the file is not locked by another used), hold down the Shift key while double-clicking a file name
- To open a second file for read access, right-click the file and choose **Open as Read-Only**



Closing Files

After completing work on a document, in a supported application, ProjectWise will provide options for checking the document back into the server.

- Check In
 - Upload any document changes from your local copy to ProjectWise and mark the file available to other users.
- Update Server Copy
 - Updates any changes to ProjectWise but keeps the file checked out. (Also, under **File > Update Server Copy**)
- Free
 - Checks document in but ignores any local document changes. This command also purges the document from your local working directory.
- Close
 - Dismisses the Check In window with no changes. The document remains checked out to you.





The OHDOT WorkSpace

This section presents a brief introduction to the OHDOTCEv2 WorkSpace. More information can be found in the **OHDOT CADD WorkSpace Basics** training guide, available in the following location within ProjectWise:

**03 Standards\CADD Standards\CONNECT_Config\WorkSpaces\OHDOTCEv02\Standards\
OHDOT Utilities\Training\OHDOTCADDWorkSpaceBasics**

OpenRoads uses a **WorkSpace** to define the CADD Standards for a WorkSet. A **Workspace** is a custom ORD environment or configuration. By selecting a workspace, you are customizing ORD for a specific discipline, project, or task. The workspace contains pointers to the CADD standards, DGN libraries, cell libraries, seed files, symbology resources, etc. necessary for the project.

ODOT maintains a custom WorkSpace for Open Roads Designer as described below. The CADD standards for ORD are maintained by the Office of CADD and Mapping Services.

When you access an ODOT project through ProjectWise Explorer, you are entering a managed workspace environment. The CADD Standards are defined for ODOT projects and do not need to be specifically selected by the user.

ODOT's CADD Standards for Bentley CONNECT products are housed within ProjectWise in the following location:

Ohio DOT Projects > 03 Standards > CADD Standards > CONNECT_Config > WorkSpaces

Two WorkSpaces that have been configured for ODOT Standards are available, **OHDOTCEv1** and **OHDOTCEv2**, as described below.

The OHDOTCEv1 WorkSpace

The OHDOTCEv1 WorkSpace has been superseded by the OHDOTCEv2 WorkSpace. This WorkSpace is provided to allow users to complete projects that were started with this WorkSpace. New projects are all configured to use the OHDOTCEv2 WorkSpace.

The OHDOTCEv2 WorkSpace

With the September 24, 2021 update to the ODOT CADD Standards, ODOT has released the OHDOTCEv2 WorkSpace. This workspace differs from the previous version primarily with the fonts that are used for plan production.

In the previous version, font Aerial was used for the annotation of both existing and proposed items. This made it difficult to differentiate between existing and proposed annotations. With the OHDOTCEv2 workspace, ODOT is moving to using font Calibri Italic for proposed items and font Calibri Light for existing items.

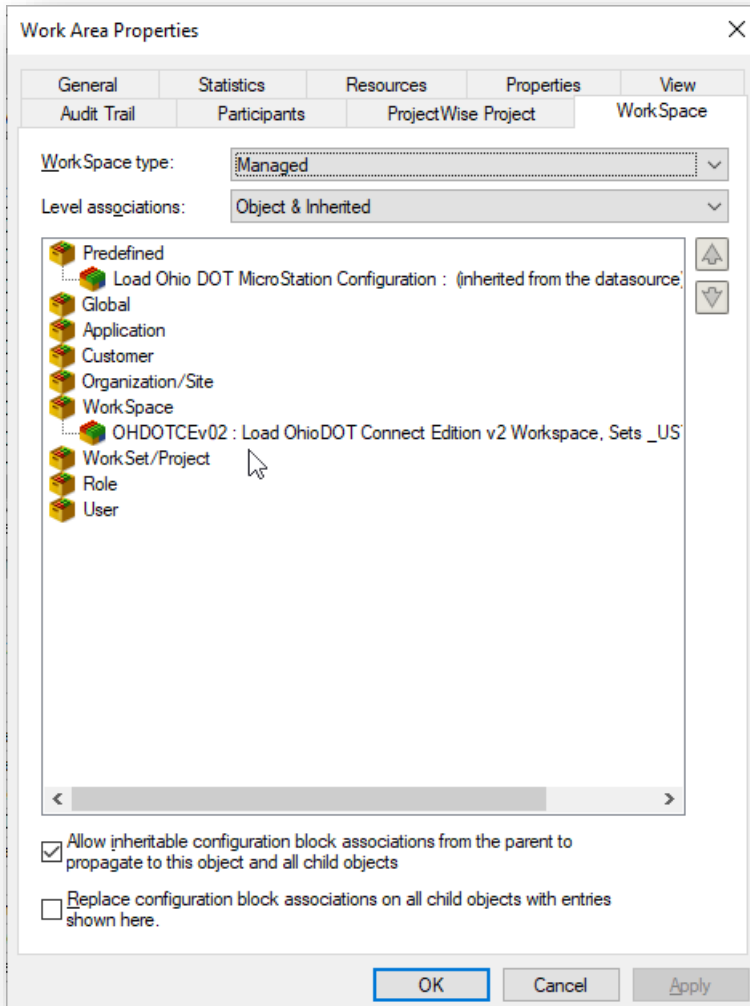
The OHDOTCEv2 WorkSpace also removes the old Drainage and Utilities dgn library from the standards.

Projects started with the OHDOTCEv1 WorkSpace should normally be completed using that WorkSpace. As new projects are started, the OHDOTCEv2 WorkSpace should be used.



When projects are created, the WorkSet is associated with the WorkSpace. ODOT's users do not need to do anything to select the appropriate WorkSpace for a project. The associated WorkSpace is automatically loaded when a design file is opened.

The **WorkSpace** that is assigned to a **WorkSet** can be reviewed in ProjectWise by right-clicking on the WorkSet folder name and choosing the **Properties** option.



From the **WorkSet Area Properties** dialog, select the **WorkSpace** tab to review the assigned WorkSpace as shown at left.

In the ODOT environment, users are not permitted to change the WorkSpace that is assigned to a WorkSet. Contact the ProjectWise administrator if the WorkSpace needs to be changed for a WorkSet.

The assigned WorkSpace can also be reviewed within a design file by selecting **File > Settings > Configuration > About Configuration**.

Exercises in this manual use the OHDOTCEv2 WorkSpace.



WorkSets

Projects in ORD are known as **WorkSets**. A WorkSet is used to house the files for each individual ODOT design project. WorkSets serve the following purpose:

- Used to store all related project information
- Define the folder structure for the project
- House project specific CADD Standards

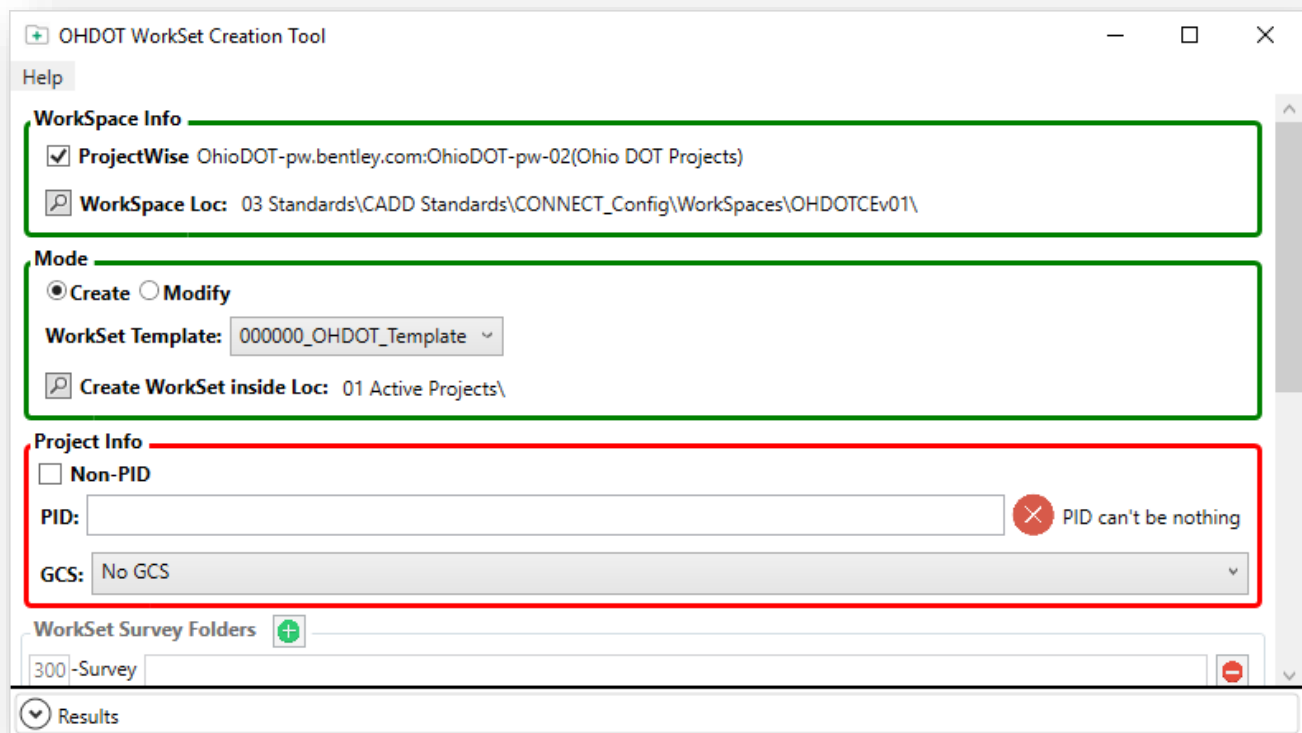
WorkSet Creation inside the ProjectWise Environment

Projects that have been assigned an ODOT Project Identification Number (PID) are created in the **Ohio DOT Projects > 01 Active Projects**.

Projects that do not yet have a PID number assigned but may be assigned a PID number at a future date are created in the **Ohio DOT Projects > 05 Additional Projects** data source.

In either case, the District ProjectWise Administrator is tasked with creating new projects using a custom application. The application is available in the OHDOT CADD Standards in the following location:

..\OHDOT\Standards\Applications\OHDOTCreateWorkSet.exe



See the application's support documentation for more information.



Geographic Coordinate Systems

OpenRoads Designer (ORD) contains Geo-Coordination features which allow users to specify the position of the design contents on the earth's surface. Once that position is established, the design can be easily coordinated with other data for which the geographic location is known. A library of predefined Geographic Coordinate Systems (GCS) is available in ORD. Additionally, custom coordinate systems can be defined for projects that have been mapped to ground coordinates by defining a custom coordinate system.

When a GCS is initially selected, you are simply defining the coordinate system where the data resides. Choosing a GCS when one has not been previously defined does not re-project existing data in the design file to the selected GCS. The content of the design file will be re-projected when changing from one GCS to another.

Once a GCS is defined, ORD understands the geographic location of your design and provides additional capabilities such as:

- Referencing other geo-located designs and raster data.
- Displaying geographic latitude and longitude.
- Entering latitude and longitude data.
- Interfacing with a Global Positioning System device to correlate your physical position with the design on a mobile computer.

NOTE: The intent of the GCS is to define the location of the data for easy integration with other georeferenced data. It is not intended to be used "on the fly" to translate the data from grid to ground, or vice versa. Once defined, the survey data should be left in the defined coordinate system.

When a new WorkSet is created in ProjectWise, the ODOT application that is used to create projects provides the option to identify the GCS for the project. The project can be defined to use the appropriate State Plane coordinate zone, or the coordinate system can be left undefined in preparation for defining a custom coordinate system.

Before any work begins on the project, it is a best practice to discuss the coordinate system requirements with the District Survey Operations manager, and then to review the coordinate system assigned to the seed files for the project to ensure it has been correctly defined.

Grid Coordinates:

- If the project is mapped to grid coordinates, the coordinate system for the project is defined using one of the standard coordinate projection systems for Ohio
- The coordinate system is assigned to the seed files for the project when the project is created

Ground Coordinates:

- If the project is mapped to ground coordinates, a custom Geographic Coordinate System (GCS) can be defined with the combined scale factor for the project. This step is not required, but it does provide advantages for users of the project data.
- If a custom coordinate system is used, the project is created with No GCS assigned. A DTY file is copied into the project that can later be customized by the Surveyor with the combined scale factor for the project

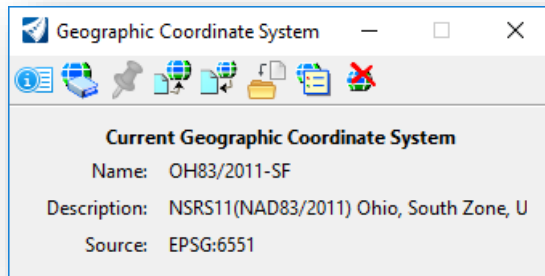


Reviewing the current GCS

The seed files for the WorkSet are defined for the appropriate coordinate system. Open each seed file to ensure that the coordinate system is correctly defined. See files for the WorkSet are in the following folder:

990-WorkSet Standards\Seed

The GCS is defined by selecting **Drawing > Utilities > Geographic > Coordinate System** to access the Geographic Coordinate System dialog shown below.

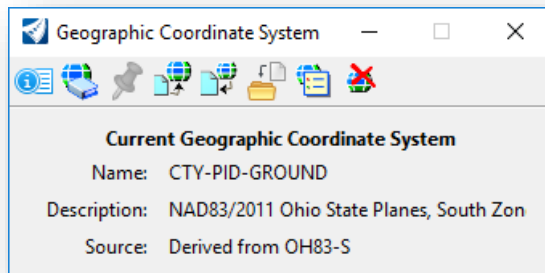


The current coordinate system is displayed on the dialog as shown at left. If no coordinate system has been defined, the **Name** will display “None”.

If the correct system is assigned for the project, close the file and continue reviewing the remaining seed files for the WorkSet.

If the coordinate system is undefined, or set incorrectly, it is best to coordinate with the District Survey Operations Manager before making any changes.

If a custom coordinate system has been defined by the Survey personnel, it will be named using the County and PID Number with the word “Ground” in the name like the example show below.



The process to define a custom coordinate system for projects mapped to ground coordinates is detailed in ODOT’s training material for OpenRoads Survey.



WorkSet Folder Structure

All ODOT projects use a standard folder structure for the WorkSet. An Excel file detailing the intended usage for each folder can be found in the ODOT Standards in the following location:

- **Ohio DOT Projects > 03 Standards > CADD Standards > CONNECT_Config > WorkSpaces > OHIODOTCEvo1 > Standards\OHDOT Utilities\Documentation\CONNECT_Project_Folders.xlsx**

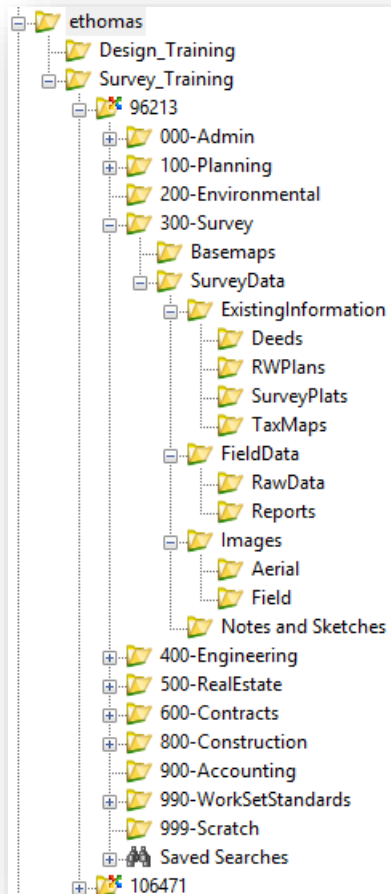
A summary of the folders used for ORD design and drafting is included below.

300-Survey

- 300-Survey\Basemaps\
Used to store survey and existing basemap design files.
DGN Files:
 - BA - Aerial Mapping
 - BC - Aerial and Ground Combined
 - FB - Ground Survey Basemap
 - No Alignments
 - No Right-of-Way
 - No Parcels
 - No Exceptions!
 - FD - New file for field terrain models
 - PC - New file for Point Cloud dataRetired Files:
 - BE - No longer used for ORD Projects

Notes:

- By default, ODOT's Roadway personnel have read-access to the 300-Survey folder and sub-folders
- Designers will reference the Survey information. Any changes that are required by the design personnel must be coordinated with Survey
- New folders can only be created at the bottom level folders.





400-Engineering

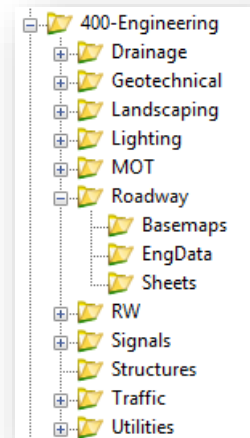
Each discipline specific folder in the 400-Engineering folder has three sub-folders as shown at right.

Alignments are stored in the following file:

- BK – Geometry Basemap, located in the 400-Engineering\Roadway\Basemaps folder
- One alignment per file. Use multiple files for multiple alignments.
Example: 123456_BK001.dgn, 123456_BK002.dgn, etc.

Notes:

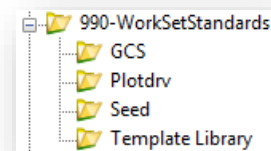
- ODOT's Surveyors have Write access to the 400-Engineering folder and sub-folders



990-WorkSetStandards

CADD Standards specific to a project are stored in the 990-WorkSet Standards folder. When a new project is created in ProjectWise, WorkSet specific CADD Standards are placed in these folders as detailed below:

- GCS
 - This folder contains the DTY file defining the Geographic Coordinate System in the case where a custom scale factor is defined for the project. The DTY file is copied from the OHDOT CADD Standards and is named "#####_Custom.dty" using the PID number for the project.
- Plotdrv
 - This folder contains the PSET file for the WorkSet. The file is copied from the OHDOT CADD Standards into this folder. The copied file is renamed "#####.pset" using the PID number.
- Seed
 - Seed files are copied from the OHDOT CADD Standards and renamed using the PID number for the project.
 - These seed files are defined using the appropriate Geographic Coordinate System when the WorkSet is created.
 - The Design seed files are renamed with the ODOT PID Number.
 - The Drawing and Sheet seed files are not renamed with the PID number. It is necessary to maintain generic names for these two seed files for the ORD sheet clipping process
- Template Library
 - The OHDOT_Templates.itl file is copied from the OHDOT CADD Standards into this folder. The copied file is renamed "#####_templates.itl" using the PID number.



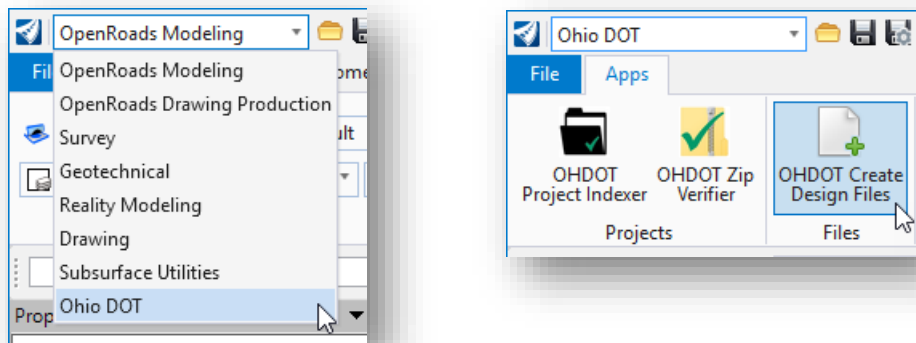


WorkSet Design File Names

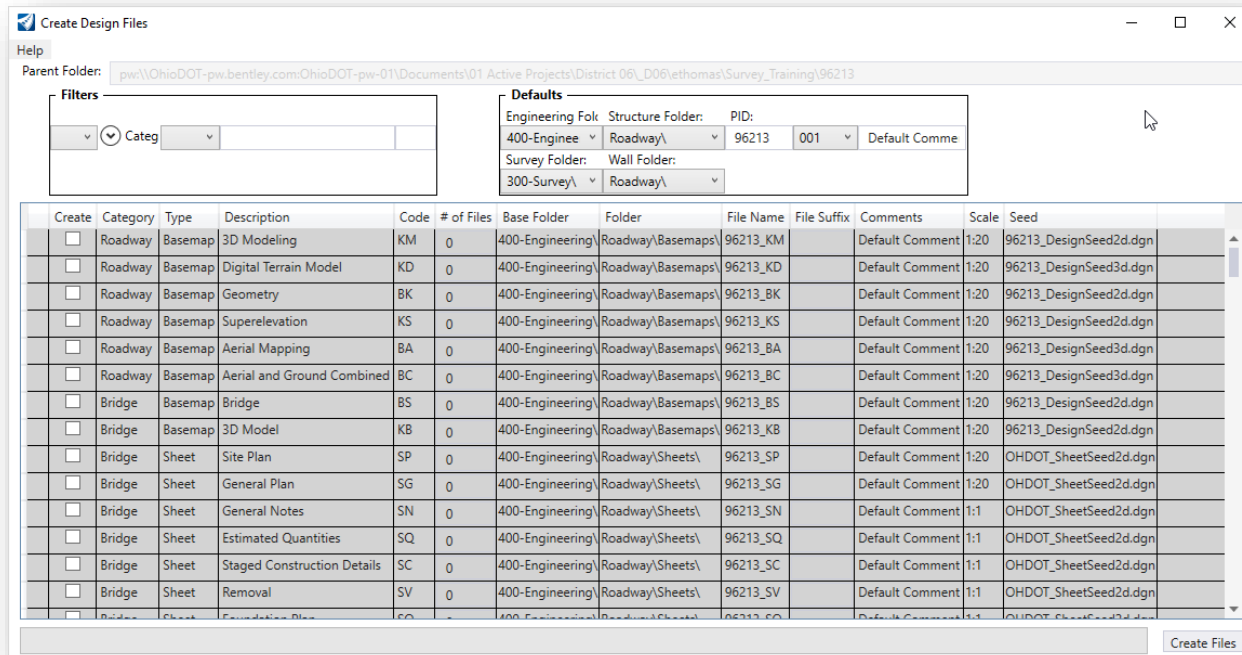
Design files are named using the same format as previously defined in the ODOTcadd Standards for MicroStation and PowerGEOPAK SS4. See the **OHDOT CADD Engineering Standards Manual, Section 304** for details.

Creating MicroStation DGN Files

New Design Files are created within ORD by use of the OHDOT Create Design Files application. The application is accessed from the **OHDOT Workflow** by selecting the **OHDOT Create Design Files** icon as shown below.



The dialog is shown below. See the application help for more information.





OpenRoads Software Version

This document was prepared using the following software version:

OpenRoads Designer CONNECT Edition – 2020 Release 1 Update 10 – Version 10.10.01.03

Contacts

For any questions, suggestions, or problems with this document please contact the ODOT Office of CADD and Mapping Services by use of the following form on the ODOT website:

https://odot.formstack.com/forms/cadd_servicerequest
