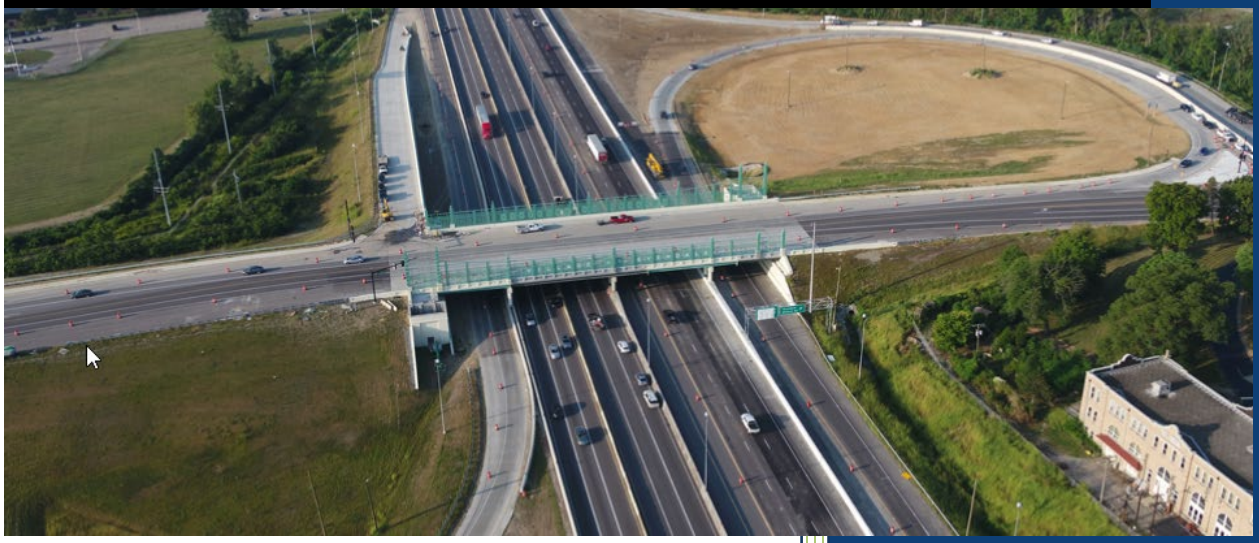
OHDOT CADD WorkSpace Basics

For OpenRoads Designer with the OHDOT CADD Standards



Department of Transportation

Office of CADD & Mapping Services

Prepared by:

The Ohio Department of Transportation,

Office of CADD and Mapping Services

Updated: 01/25

Table of Contents

1 Introduction

Course Prerequisites

This training course is intended to familiarize ODOT personnel involved in the production of highway construction plans using Bentley's OpenRoads Designer CONNECT Edition (ORD) software with the OHDOT CADD Standards in the ProjectWise Environment.

This training course is intended for ODOT personnel currently working in a plan production capacity. This course does not cover MicroStation or OpenRoads software operation. It is assumed the user is familiar with the following CADD related functions:

- Proficient with basic Windows 11 operations
- Accessing ProjectWise and opening Design Files
- MicroStation basics, including the following:
    - Creating Files
    - Seed Files
    - Cells
    - Editing Text
    - Plotting
    - Reference Attachments
    - Models
    - Annotation Scale
    - Etc…

CPD Credit

No CPD credits will be issued for this class.

Course Outline

The following topics are covered in the class:

- ProjectWise
- OHDOT CADD Standards Overview
- WorkSets
- ORD Interface
- MicroStation Design Files
- Creating Design Files
- Sheet Design Files and Sheet Cells
- Title Sheet Applications
- General Notes Sheets
- General Summary
- Summary Tables with AutoTable
- Sheet Cross References
- Project Indexer
- Print Organizer

Training Guides

OHDOT'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 the installation of the OHDOT CADD Standards within ProjectWise:

Ohio DOT Projects\Documents\03 Standards\CONNECT_Config\WorkSpaces\OHDOTCEv02\ Standards\OHDOT Utilities\Training\OHDOTCADDWorkSpaceBasics\

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

...\OHDOT\Standards\OHDOT Utilities\Training\OHDOTCADDWorkSpaceBasics\

ODOT CADD Standards and Support

The OHDOT CADD Standards for ORD are maintained and distributed by the ODOT Office of CADD and Mapping Services.

CADD Services | Ohio Department of Transportation

CADD Standard Manual

The OHDOT CADD Engineering Standards manual has been integrated back into the Location & Design Manual (L&D) Volume 3 creating sections 1200 and 1300. ODOT offers the L&D Vol. 3, which is available in PDF format and can be downloaded on the ODOT Website. From the CADD Support website listed above, choose the Standards Manuals link on the left side of the page and you will be redirected to Launch the L&D Vol. 3.

Location & Design Manual, Volume 3 - Highway Plans | Ohio Department of Transportation

CADD Support Request Form

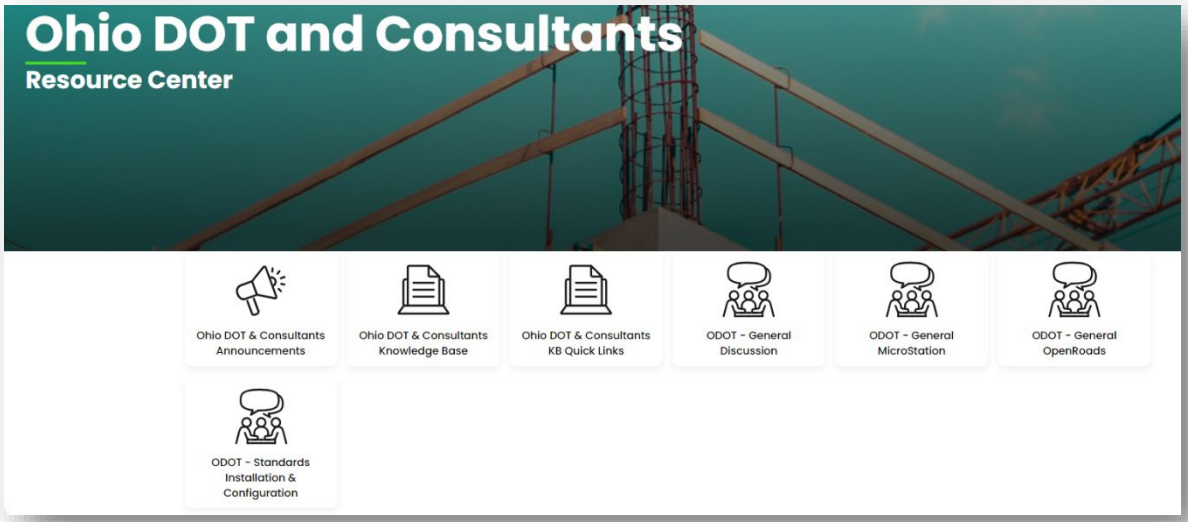
Support for Bentley OpenRoads Survey is the responsibility of the Office of CADD and Mapping Services. Support questions can be sent to the CADD Support staff using the following form:

CADD Support Request - Formstack

Ohio DOT and Consultants KB Page

The CADD Support Knowledge Base page, hosted in the Bentley Communities, is the go-to source for ODOT's training and support content.

Ohio DOT and Consultants - Communities (service-now.com)



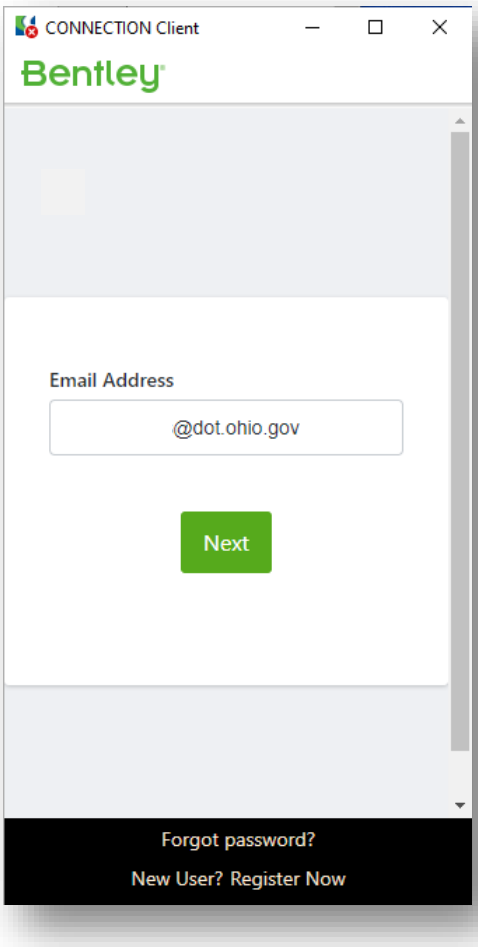
Design Resource Refence Center (DRRC) (Replaced by the Publications Gatway)

ODOT's Design Resource Reference Center is a centralized online reference center to help locate online or printed material. Additionally, several mailing lists are available to keep you informed about updates to ODOT standards. Visit the Design Resource Reference Center at the following URL:

Publications | Ohio Department of Transportation

Bentley CONNECTION Client

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



ODOT users will log in using your ODOT email address. The password is automatically applied using your ODOT password.

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

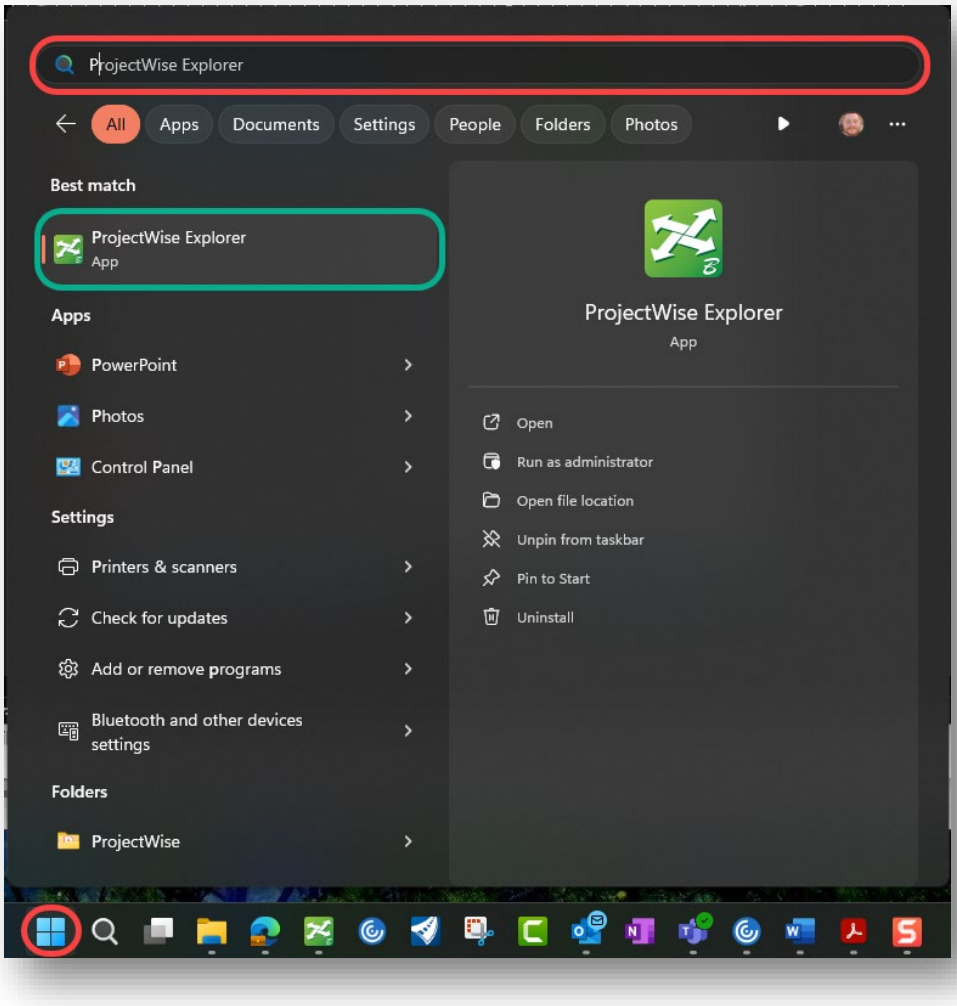
2 ProjectWise

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 Microsoft Office.

As ODOT migrates to OpenRoads Designer (ORD), all internal projects started using ORD will be housed in ProjectWise.

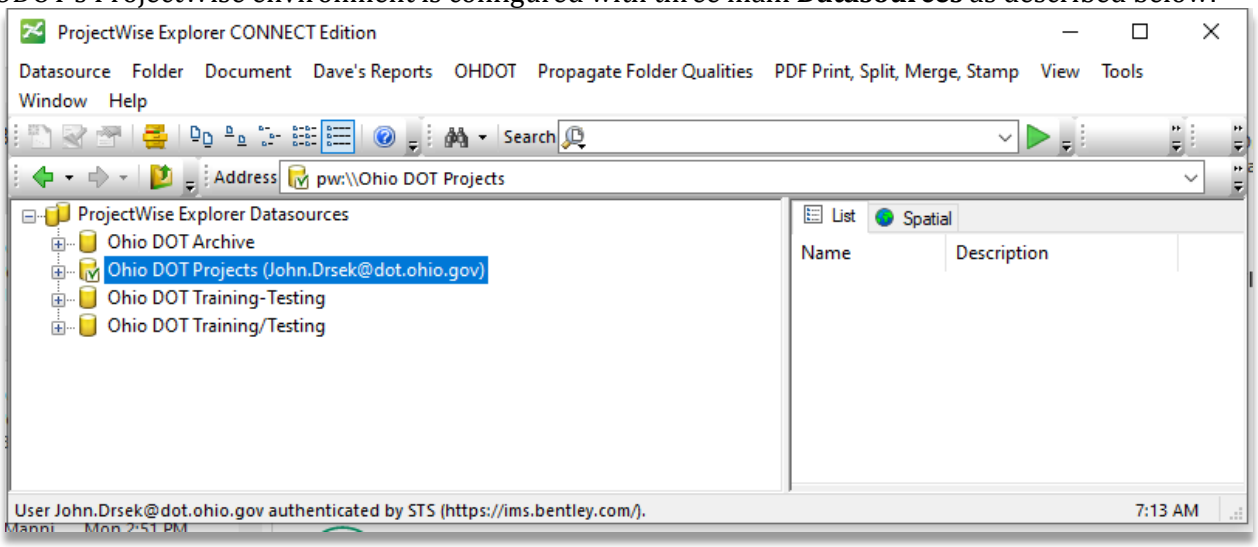
ProjectWise Explorer

ProjectWise Explorer is used to access project information stored in ProjectWise. The application is accessed from the Windows Start Menu, or by using the Windows Search function as shown below.



Data Sources

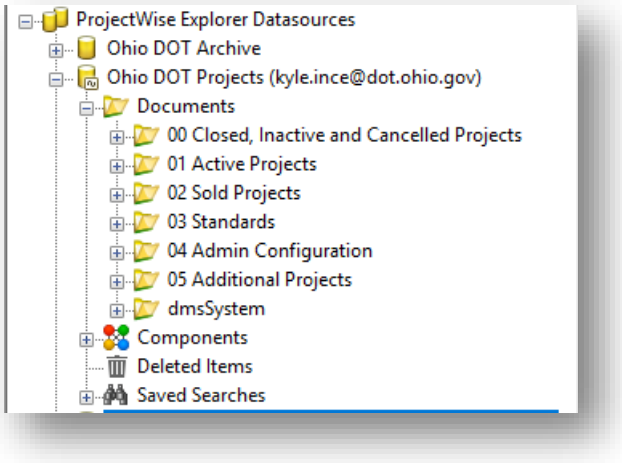
ODOT's ProjectWise environment is configured with three main **Datasources** as described below:



- Ohio DOT Archive
  - Read Only repository for completed plan sets.
- Ohio DOT Projects
  - This is the active projects directory (replaces the "I drive")
  - All ODOT projects using Bentley CONNECT Software (ORD) will be housed here.
- Ohio DOT Training-Testing
  - "Sandbox" area for training and testing which mirrors the active projects directory.
- Ohio DOT Training/Testing
  - Old Data source should not be used!

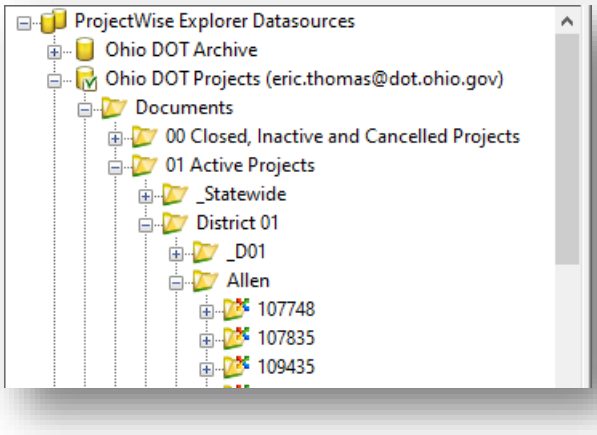
The Ohio DOT Projects Datasource

The Ohio DOT Projects Datasourse is organized into sub-folders as shown below.



- 00 Closed, Inactive and Cancelled Projects
  - Archive of project data that is completed or cancelled.
- 01 Active Projects
  - Active PID projects
- 02 Sold Projects
  - Project Data location when project is in construction.
- 03 Standards
  - CADD Standards, Help Documents, Templates, etc.
- 04 Admin Configuration (Hidden if you are not an administrator)
  - Access control models and other ProjectWise configuration documents
- 05 Additional Projects
  - Area where projects without a PID may be worked on using OHDOT standards.

The **01 Active Projects** folder is organized by District, County, and PID as shown below.



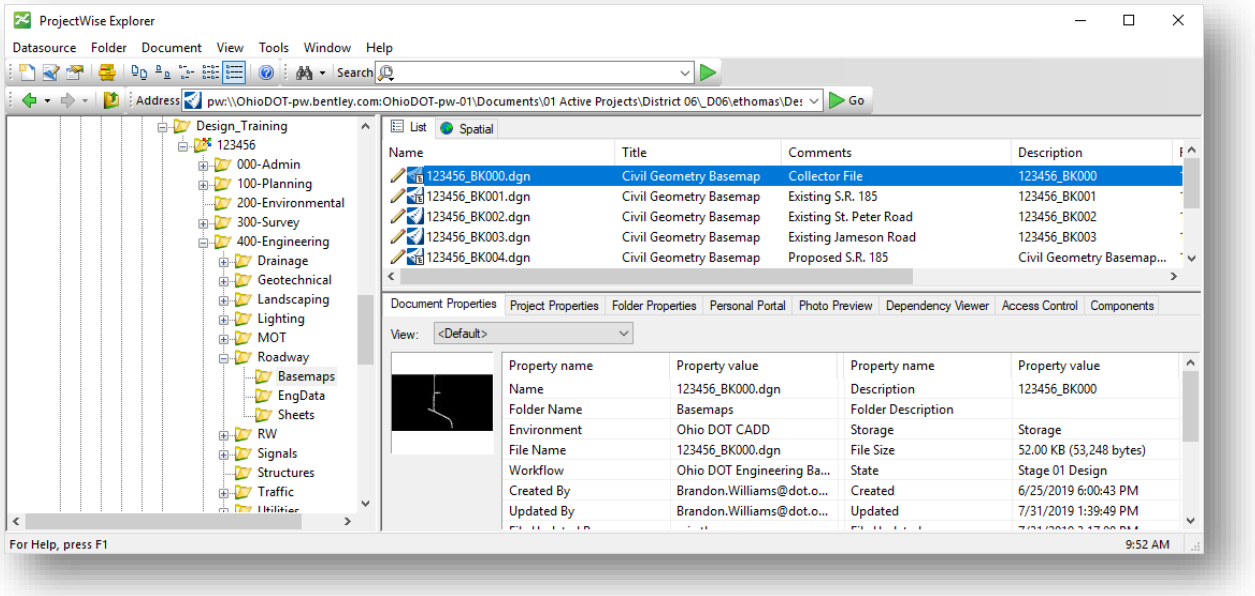
The _D## folder is used for District-wide projects.

An ODOT project is referred to as a “WorkSet” in the ProjectWise environment.

Opening Files with ProjectWise

To access the files in a WorkSet, select the **Ohio DOT Projects** data source from the ProjectWise Explorer dialog and browse to the location of the desired project.

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:

	File has Read/Write access • 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.
	File has Read Only access • 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.
	File is Checked Out by you (others see the Locked symbol) • 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.
	File is Locked • 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.
	File has been Exported by you (others see the Locked symbol) • 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.
	File is in Final Status • 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 performed:

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.

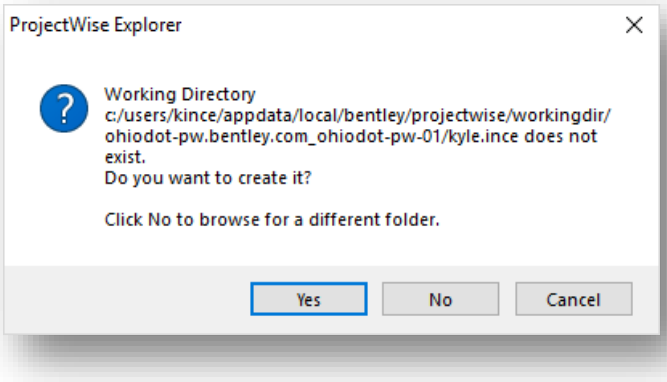
CADD Standards

ProjectWise maintains a copy of the CADD Standards on the local computer. Once downloaded, this provides faster access to the CADD Standards as compared to accessing the standards from a remote server location.

The first time you open a file from a WorkSet in ProjectWise, the CADD Standards are copied from the ProjectWise server to the local computer. Copying all the CADD Standards locally does take a few minutes, but copying a complete set of the CADD Standards is a one-time process the first time a user opens a file from ProjectWise on the computer. Once the CADD Standards have been copied to the local computer, ProjectWise keeps the local copy of the CADD Standards up to date by comparing the local copy to the server copy when a file is opened and only downloads new or changed files.

Working Directory

ProjectWise maintains a local folder for each WorkSet and the files that you access in the project. The first time you open a file from a specific WorkSet, you will see the **create working directory** dialog shown below.



Select **Yes**. ProjectWise copies the necessary 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.

Opening Multiple MicroStation Design Files

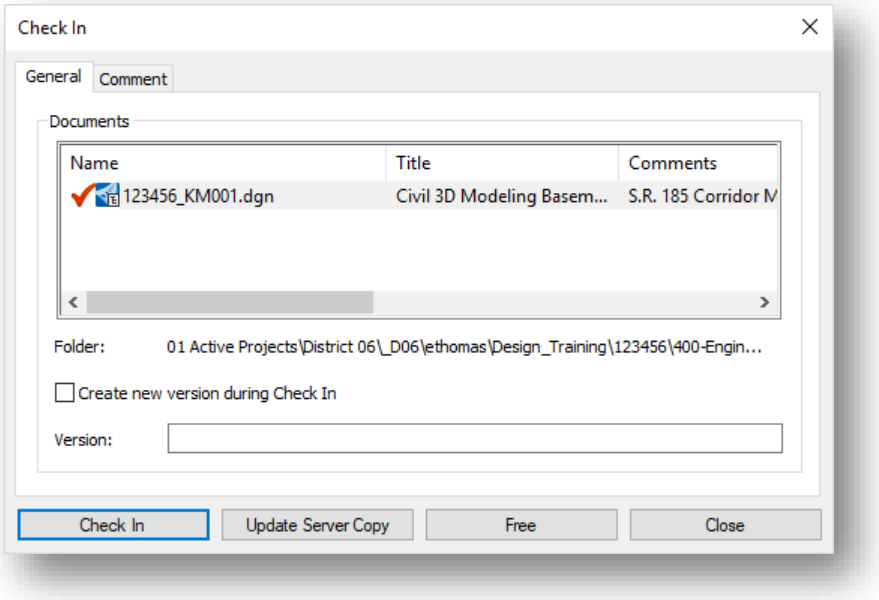
Double-clicking on a file name opens the selected file. By default, ProjectWise does not allow the user to open multiple design files simultaneously. If a MicroStation design file is currently opened, the software forces the user to close the current design file.

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 user), 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 the document back into ProjectWise 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.

Additional ProjectWise training resources

This section serves as a brief introduction to ProjectWise. The Office of CADD and Mapping Services provides additional training materials for ProjectWise online from the CADD Support KB Page.

ProjectWise Training Videos

3 OHDOT CADD Standards Overview

WorkSpaces

OpenRoads uses a **WorkSpace** to define the CADD Standards for a particular **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.

When you access an ODOT project through ProjectWise Explorer, you will be 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 WorkSpace that have been configured for ODOT Standards are available, **OHDOTCEv01** and **OHDOTCEv02**, as described below.

CADD standards for ORD are maintained by the Office of CADD and Mapping Services.

The OHDOTCEv01 WorkSpace

The OHDOTCEv01 WorkSpace has been superseded by the OHDOTCEv02 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 OHDOTCEv02 WorkSpace.

The OHDOTCEv02 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.

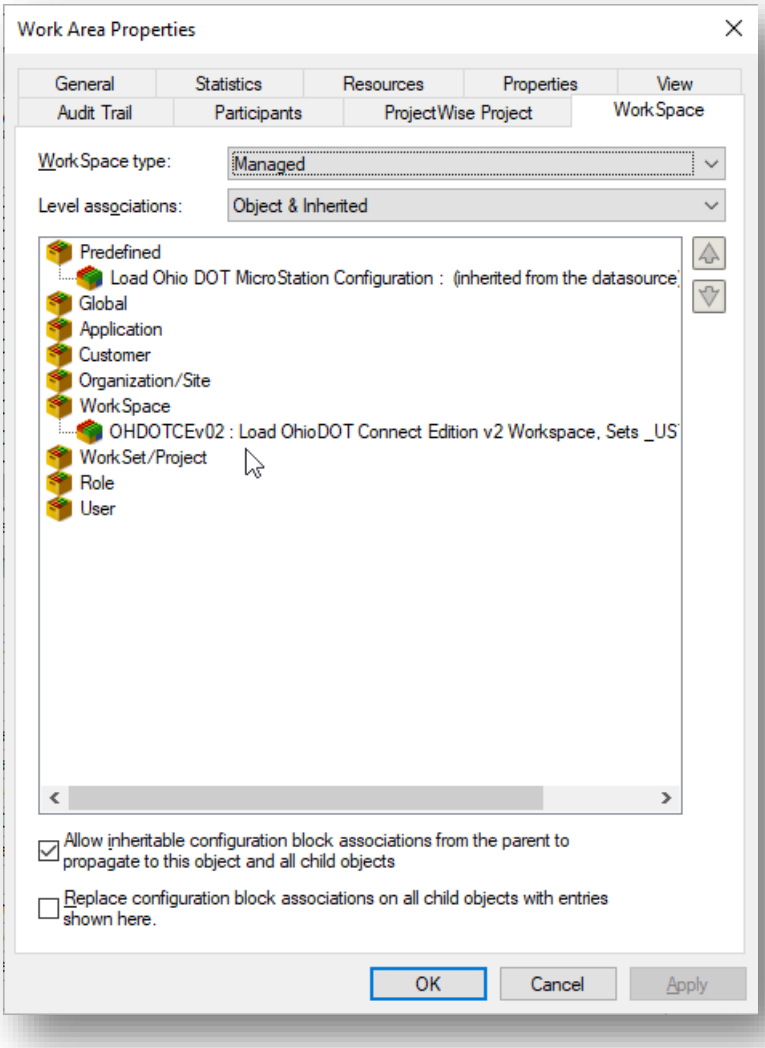
In the previous version, font Aerial was used for the annotation of both existing and proposed items. This made it difficult to differentiate between existing and proposed annotations. With the OHDOTCEv02 workspace, ODOT is moving to using font Calibri Italic for proposed items and font Calibri Light for existing items.

The ODOTCEv02 WorkSpace also removes the old Drainage and Utilities dgn library from the standards.

Projects started with the OHDOTCEv01 WorkSpace should normally be completed using that WorkSpace. As new projects are started, the OHDOTCEv02 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 particular WorkSet.

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

Exercises in this manual use the OHDOTCEv02 WorkSpace.

OHDOT CADD Engineering Standards Manual

This training guide refers to several sections of the Location and Design Manual Volume 3. In all cases, the L&D Vol. 3 supersedes the information presented in this training guide. It is the responsibility of the designer to familiarize themselves with the content of the manual. A link to the L&D Vol. 3 is provided in the CADD Standards and Support section of this manual.

OHDOT Compatibility with Older Projects

The OHDOT Standards were specifically developed for MicroStation CONNECT Edition and OpenRoads Designer CONNECT Edition. These CADD Standards are not compatible with projects currently under development using the legacy ODOTcadd Standards with PowerGEOPAK SelectSeries 10 or earlier.

Due to these incompatibilities, it is recommended that users complete existing projects using Bentley's Select Series 10 software with the legacy ODOTcadd Standards.

ODOT Project Configuration and Directory Structure

The **Location and Design Manual Volume 3, Section 1204.3.2** defines the required directory structure to be used on all ODOT projects. The folder structure has been updated for the OHDOT CADD Standards with input from all 12 Districts. The folder structure is to be used for all new projects started with ORD and ProjectWise.

See Chapter 4 for more information on the new folder structure and an ODOT program used to create new projects.

Design File Names

The **Location and Design Manual Volume 3, Section 1204.3.4 File Naming Conventions**, defines the standard MicroStation design file names to be used on all ODOT projects.

ODOT provides an application to assist with the creation of MicroStation design files using the ODOT file naming convention and folder structure. See Chapter 5 for more information.

4 WorkSets

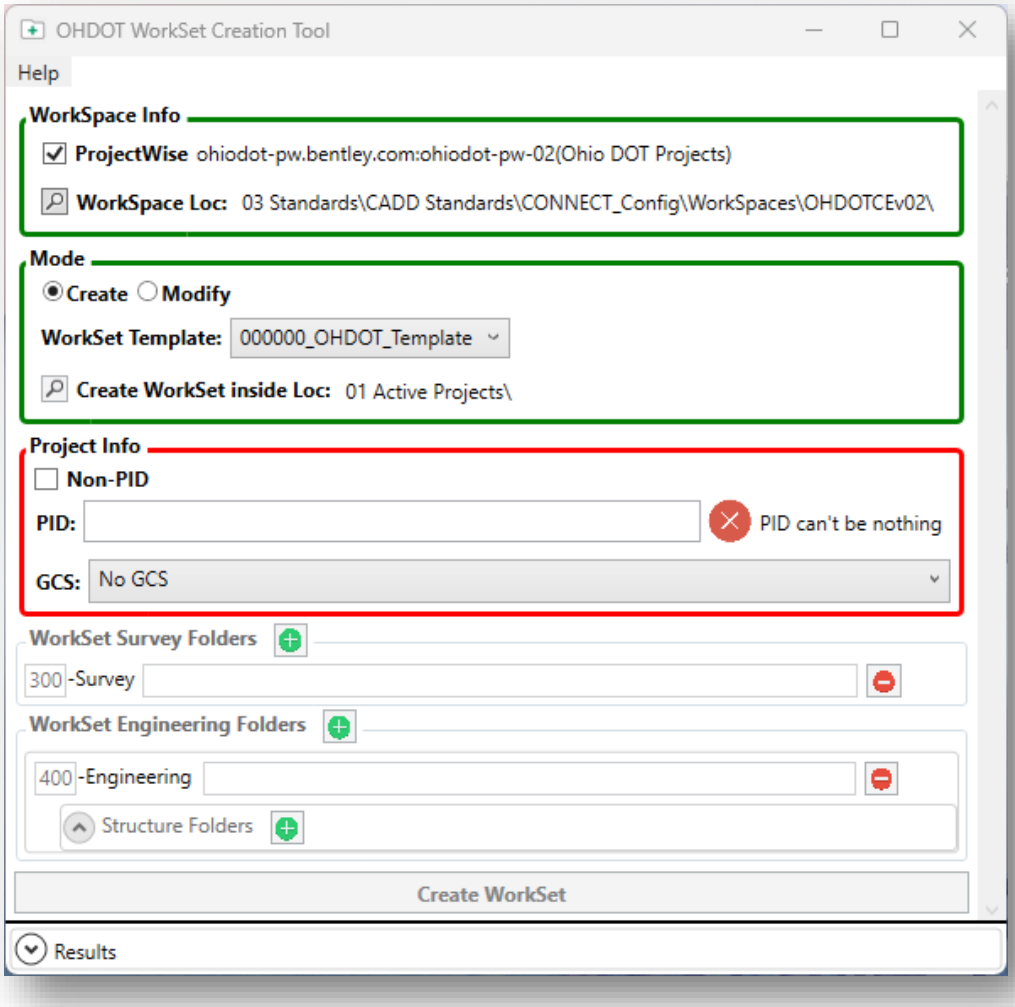
A WorkSet is used to house the files for each individual ODOT design project. WorkSets serve the following purpose:

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

WorkSet Creation

ODOT provides a custom application that is used to create new WorkSets. The application is available in the following location within ProjectWise:

Ohio DOT Projects > Documents > 03 Standards > CADD Standards > CONNECT_Config > WorkSpaces > OHDOTCEv02 > Standards > Applications > OHDOTCreateWorkSet.exe



The application is also available from the ORD ribbon by selecting **OhioDOT > Apps > OHDOT Create WorkSet**.

For complete documentation of this application, choose the **Help** menu to review the PDF documentation, or view a video demonstration of the application.

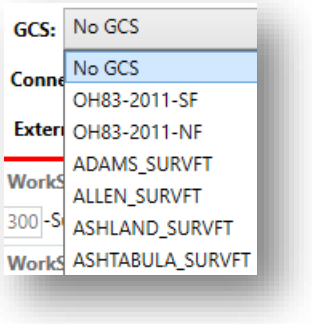
When the WorkSet is created, projects that have been assigned an ODOT Project Identification Number (PID) are created in the **Ohio DOT Projects > 01 Active Projects** data source in ProjectWise.

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.

Geographic Coordinate Systems (GCS)

One of the key settings is the definition of the **Geographic Coordinate System** (GCS). The GCS is used to define the coordinate location of the design file 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.

The **OHDOT_CreateWorkSet** application has three settings to define the GCS as shown at right.



- Options for projects mapped to the Ohio North or Ohio South State Plane zones are supported.
- Options for projects mapped to the County can use the CTY_SURVFT.
- Select the **No GCS** for projects that will use a custom coordinate system for ground coordinates.

When the WorkSet is created, the selected GCS is applied to the Seed files that are created for the WorkSet. See the WorkSet Seed Files section for more information.

If the **No GCS** option is selected, it is necessary to define the custom coordinate system for each of the seed files. This is normally done by the District Survey personnel. See the OHDOT ORD Survey Training documentation for more information.

If you are unsure which GCS option should be used, contact the District Survey Operations Manager before creating the WorkSet.

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 > OHDOTCEv02 > Standards\OHDOT Utilities\Documentation\ CONNECT_Project_Folders.xlsx

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

300-Survey

300-Survey\Basemaps\

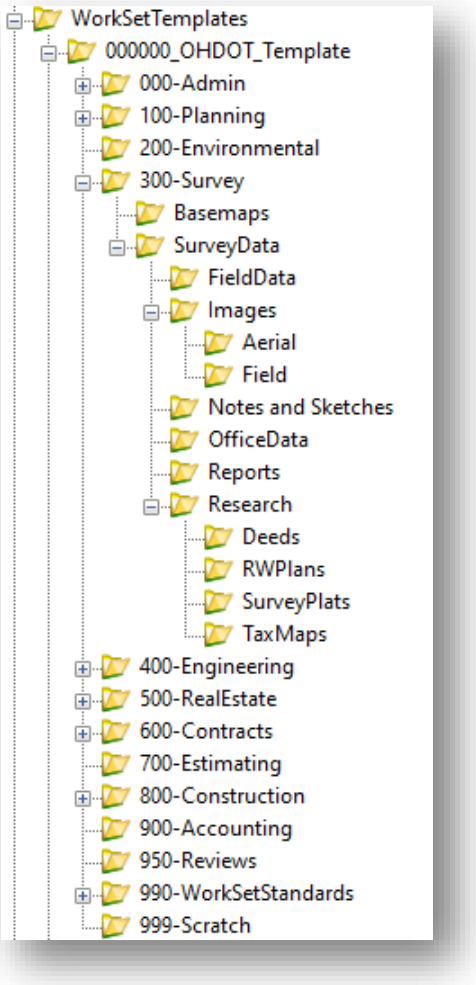
Used to store survey and existing basemap design files.

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 data

Retired Files:

- BE - No longer used for ORD Projects

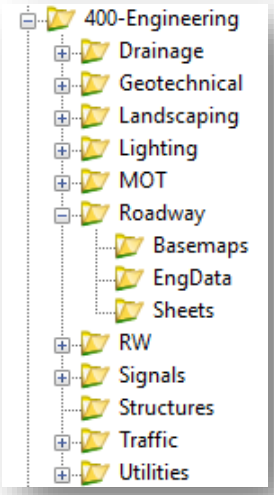


Notes:

- 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 the Surveyor.
- 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 on the right.



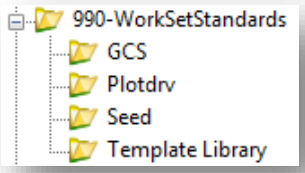
- Basemaps
  - Used to store ORD basemap design files.
  - Users are not permitted to create sub-folders.
- EngData
  - Used to store engineering data related to the Discipline folder.
  - Users are permitted to create sub-folders.
- Sheets
  - Used to store ORD sheet design files.
  - Users are not permitted to create sub-folders.

Notes:

- ODOT's Surveyors have read/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 Seed Files

A seed file is an empty MicroStation design file that is used as a template for the creation of new design files. ODOT provides seed files within the OHDOT CADD Standards that have been configured specifically to meet ODOT requirements.

When a new WorkSet is created, the seed files located in the OHDOT Standards are copied to the 990-WorkSetStandards\Seed folder and are renamed according to the PID number as detailed below.

File Name	Model	Intended Use
######_DesignSeed2d.dgn	Design	Used to create 2d basemap design files
######_DesignSeed3d.dgn	Design	Used to create 3d basemap design files
OHDOT_DrawingSeed2d.dgn	Drawing	Used as the seed file for the Drawing Model in the ORD Sheet Clipping process
OHDOT_SheetSeed2d.dgn	Sheet	Used as the seed file for the Sheet Model in the ORD Sheet Clipping process

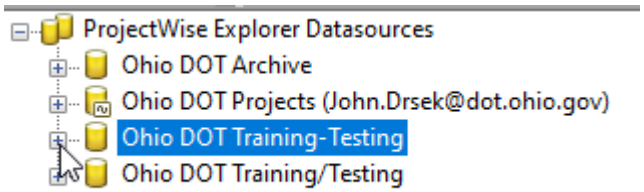
Notes:

- ###### = The PID number for the project
- Each seed file contains only one model as listed in the table above.

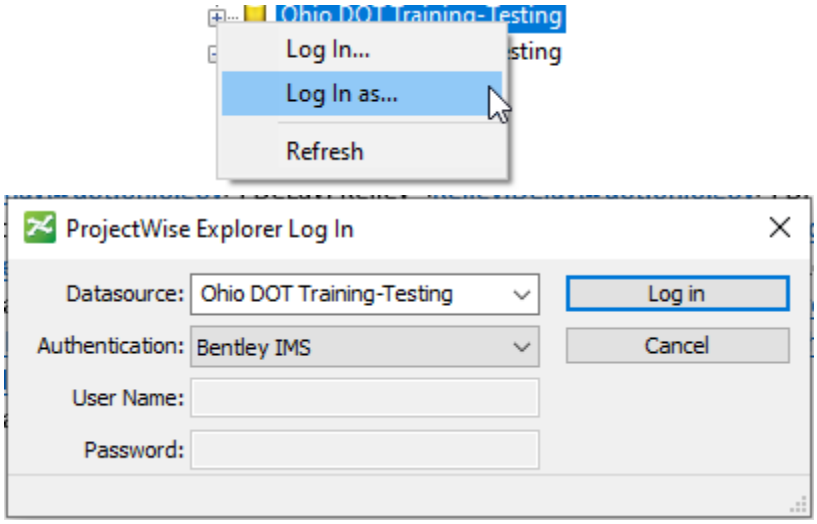
Exercise: Accessing the Training WorkSet

For this training class a copy of the training WorkSet has been created within ProjectWise for each student. In this exercise, we will review the content of the WorkSet.

- Open ProjectWise Explorer
- Clicking on the expander button will automatically sign you into the datasource (as long as you're signed into CONNECTION Client, if not CONNECT Client will launch).



- You can also right click on the datasource to get the following options. Note that "Log In as…" will open the log in dialog shown below, Authentication should always be set to Bentley IMS.



- Browse to the sample project location provided by the instructor.

- Take a few minutes to review the folder structure and files. This is the WorkSet that will be used for the remaining exercises.

Notes about the training WorkSet:

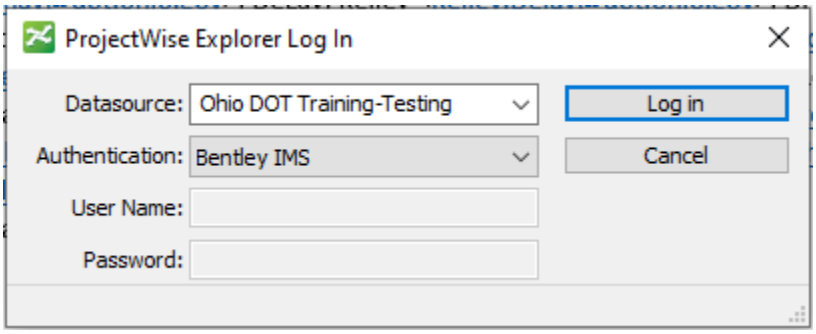
- This is not a complete project. The WorkSet contains files specifically for the training and does not represent a completed project.
- The CADD Standards manual supersedes the example files

5 ORD Interface

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.

- Open **ProjectWise Explorer** if it is not currently open.
- When prompted, sign into ProjectWise as shown below.



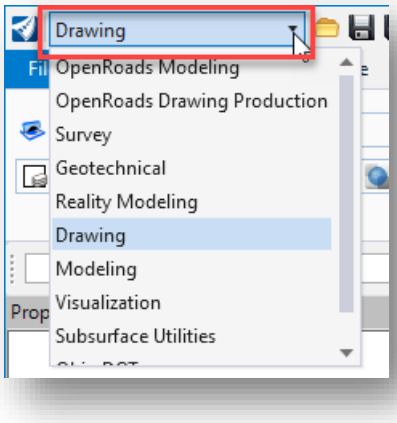
- Browse to the sample project to open the file listed below.

..\78086\400-Roadway\Basemaps\78086_BK001.dgn

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

WorkFlows

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

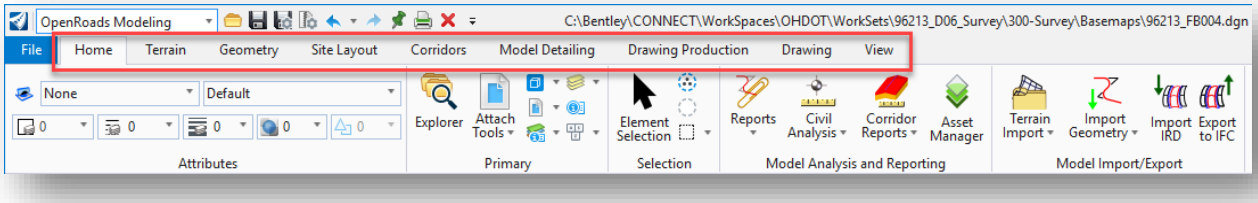


The **WorkFlows** present the various ORD commands logically organized according to a task. For example, the **Drawing** workflow contains commands that are used for typical MicroStation drawing tasks.

The most used drawing functions are available in the other workflows, as described below.

Tabs

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



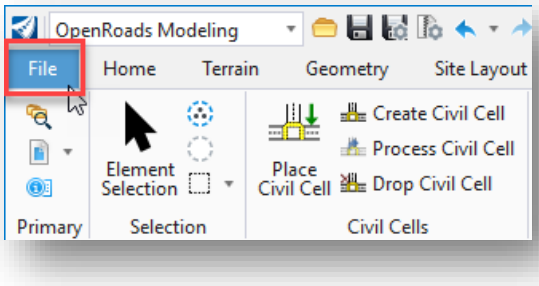
Each tab groups like commands into a logical organization of the various tools.

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

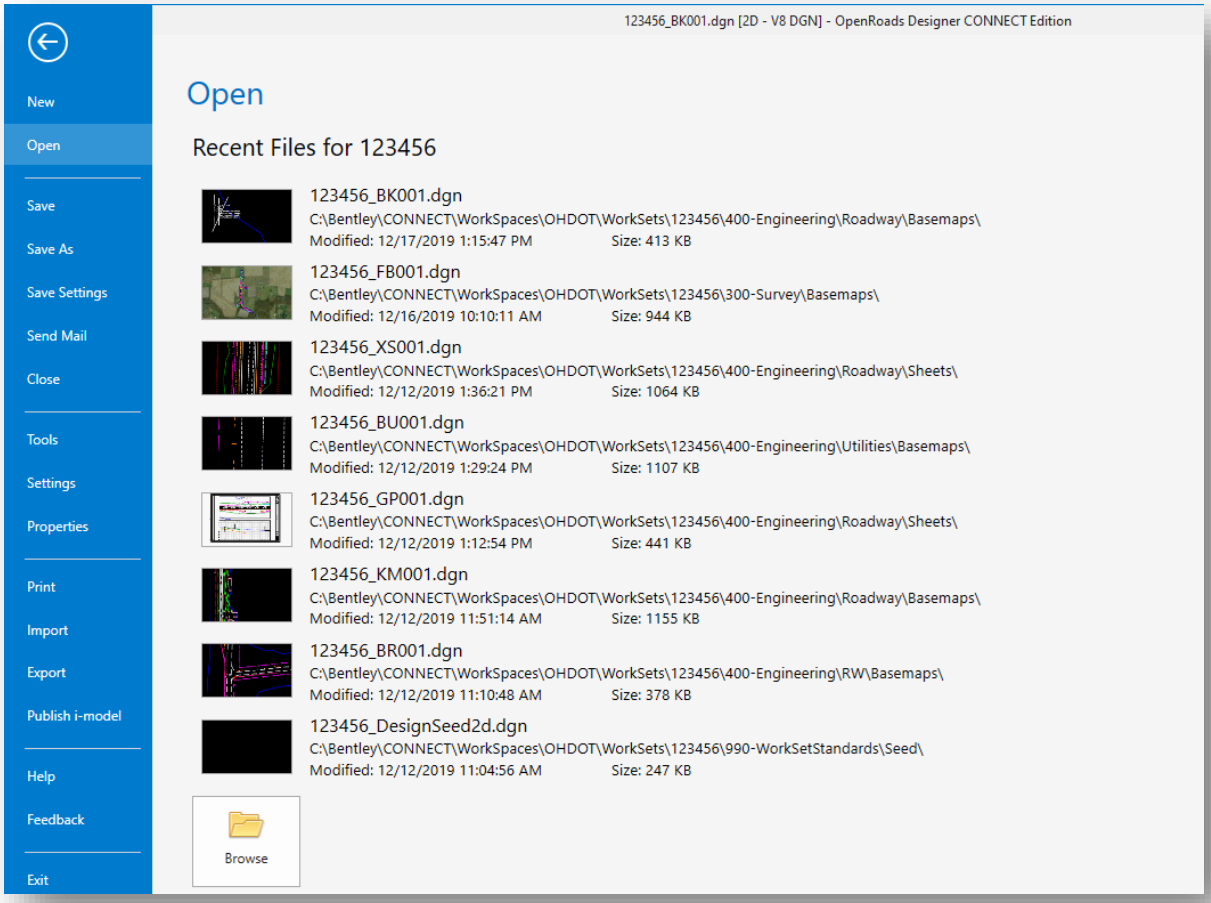
BackStage

The ribbon contains commands that are used for ORD and MicroStation related drawing and design tasks. Tools that are not drawing 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-right of the ORD user interface.



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



All the functions available from the **BackStage** are not covered in this introductory class. Two of the most accessed functions are listed below.

User Preferences

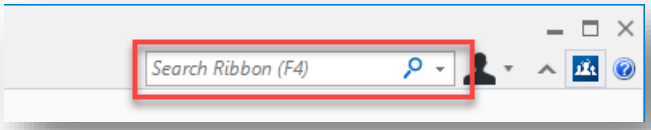
User Preferences are accessed from the **BackStage** by selecting **Settings > User > Preferences**.

Design File Settings

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

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.



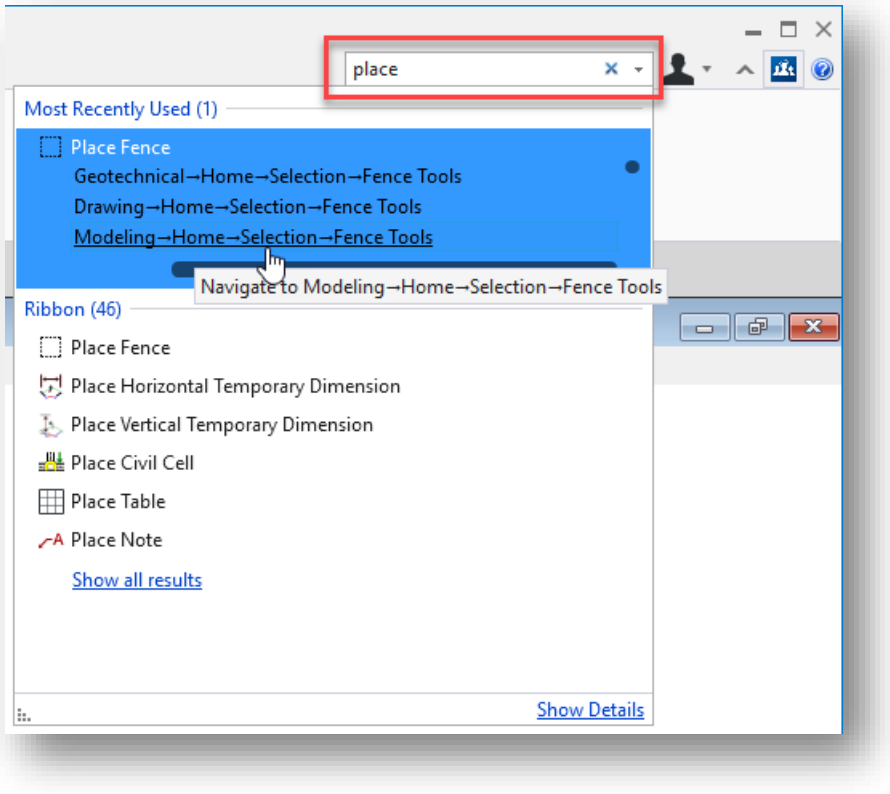
As you key in the name of a command, the Search Ribbon function will show a list of commands matching the text string as it is entered. An example is shown below.

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.

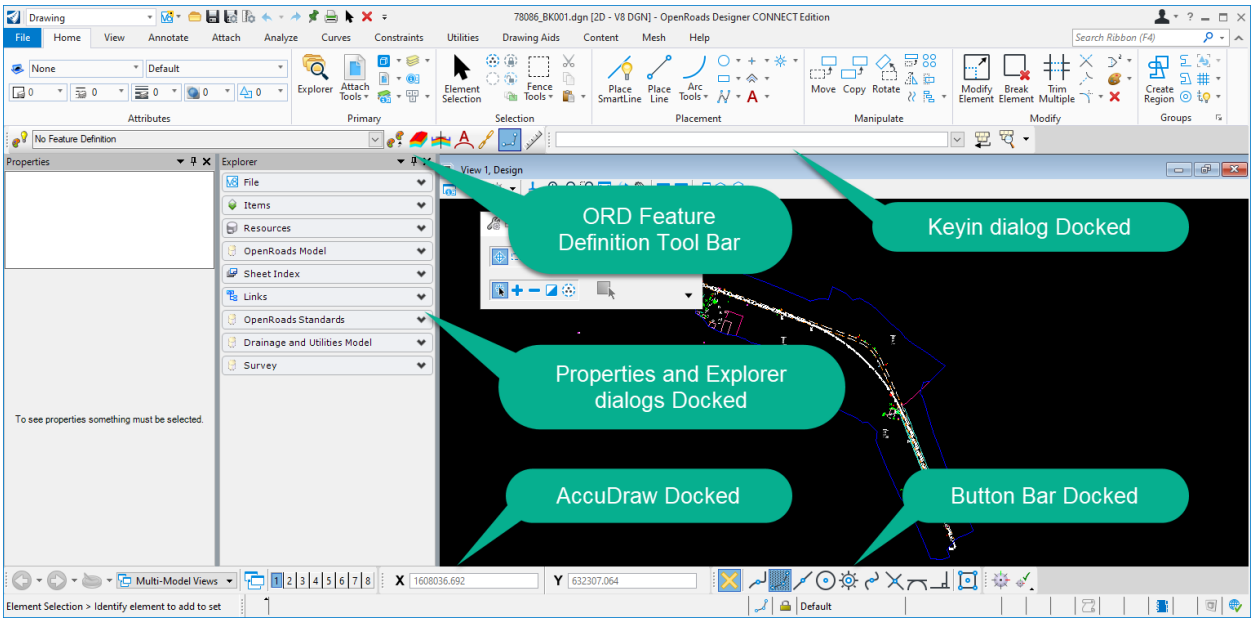


OHDOT WorkSpace Customizations

The OHDOT CADD Standards include several customizations to the ORD Interface. These customizations are summarized below.

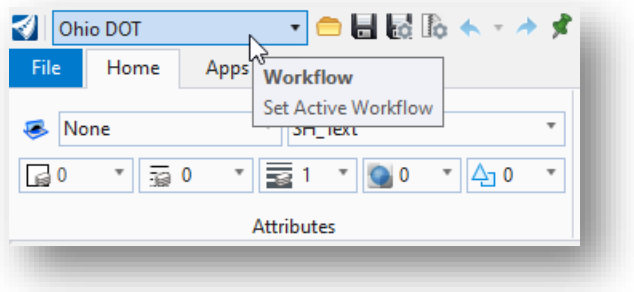
General WorkSpace Customizations

The dialog boxes shown below have been configured as defaults for ORD in the OHDOT WorkSpace.



The Ohio DOT WorkFlow

Various applications that have been developed by ODOT are available from the Ohio DOT WorkFlow, which is selected from the WorkFlow menu at the upper left of the ORD interface.



The Ohio Dot Workflow includes the following three tabs:

Home

This is provided to give access to some commonly used Bentley tools without the need to change to a different Workflow.

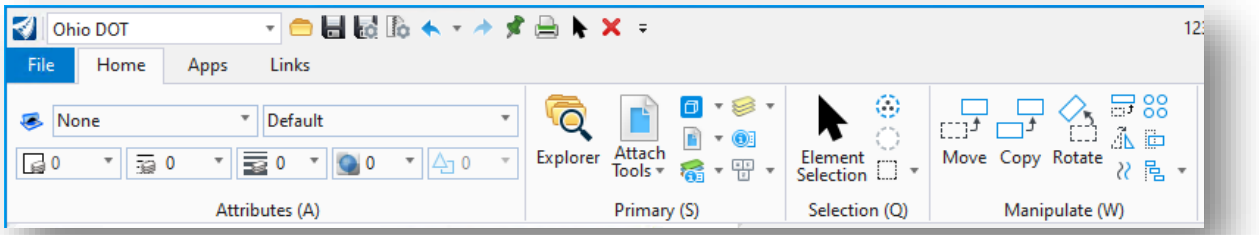
Apps

This tab provides access to the various ODOT custom applications.

Links
The Links tab contains several links to commonly used CADD related resources and support pages.

The Home Tab

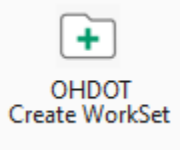
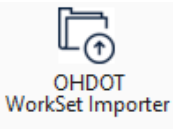
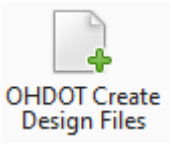
Each WorkFlow in the ORD interface includes a home tab. The Home tab for the OHDOT WorkFlow is shown below.

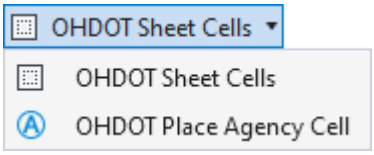
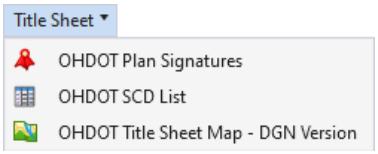
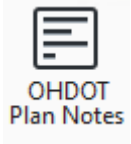


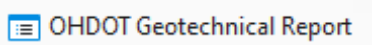
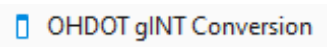
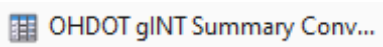
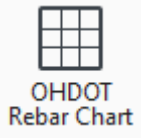
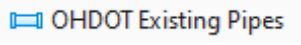
The first three groups, **Attributes**, **Primary**, and **Selection,** are the same for the **Home** tab on each of the available WorkFlows.

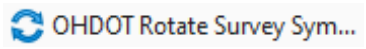
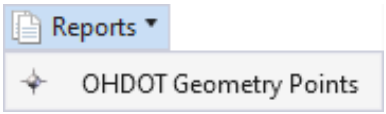
The Apps Tab

The Office of CADD and Mapping Services has developed several custom applications that are used in the plan production process. A list of the available applications, with a brief description of their function, is provided below. See the documentation for each application for more information on how each of them functions.

OHDOT Create WorkSet This stand-alone application is used to create new WorkSets using the ODOT folder structure, for both ProjectWise and non-ProjectWise users.	
OHDOTCEv02 Project Indexer Stand-alone application used to assist the user to create a project index file in Excel and a ZIP file for electronic deliverables.	
OHDOT WorkSet Importer Import zip files generated from the OHDOTCEv02 Indexer app into ProjectWise and fix references.	
OHDOT Create Design Files The application is used to create design files for the active WorkSet. The files are created and named according to ODOT Standards, using the ODOT folder structure. The application is used for both ProjectWise and non-ProjectWise users.	

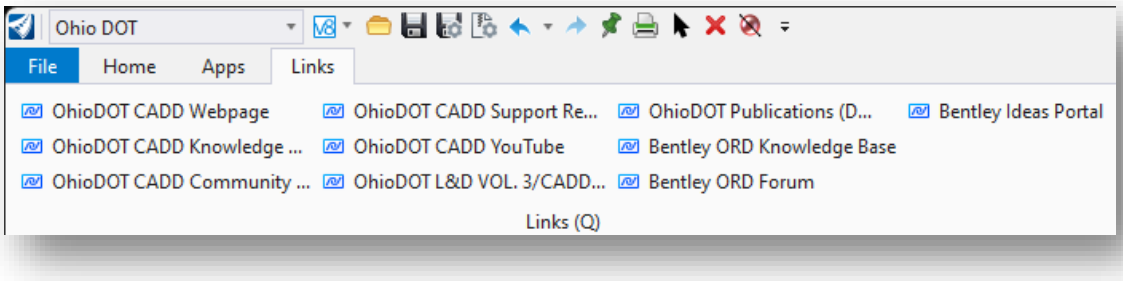
OHDOT Sheet Manager This MicroStation add-in application is used to manage all the sheet attributes, such as the page number, sheet title, etc., for the various ODOT plan sheet borders.	
OHDOT Sheet Cells Used to place sheet borders according to ODOT standards. **OHDOT Place Agency Cell** Used to place the configured Agency Cell on previously generated sheet cells.	
OHDOT Cross Refs This application is used to create and update sheet cross-reference text in a MicroStation file. The current version of the application does not function in the ProjectWise environment.	
OHDOT Plan Signatures Used to generate a digital signature field and engineer seal. This application helps the user to place these digital signatures and engineering seals on the title sheets or signature sheets. **OHDOT SCD List** This application is used to place, manage, and update the Standard Construction Drawing list and Supplemental Specification list on an ODOT title sheet. **OHDOT Title Sheet Map – DGN Version** Used to generate a title sheet map that uses DGN elements and places them directly within the dgn file.	
OHDOT Balloon This MicroStation Visual Basic Application is used to place balloon references on the plan sheets and typical section sheets.	
OHDOT Signs This MicroStation Visual Basic Application is used to place existing and proposed sign information on ODOT plan sheets.	
OHDOT Plan Notes MicroStation Visual Basic Application used to place standard plan notes on an ODOT General Notes sheet.	
OHDOT DU Item Type Sync App used for setting up/updating drainage and utilities annotation.	

OHDOT Text Masking Applies a masking shape to already placed annotation.	
OHDOT Add This MicroStation Visual Basic Application is used to add selected numeric text elements to place the total in the file at a user specified location.	
OHDOT Dirt Calc This application is used to measure areas and end widths on completed cross sections to assist the user to generate cross section seeding and earthwork quantities.	
OHDOT Property Line Marker This MicroStation Visual Basic Application is used to place a property line marker or ownership marker along the selected curvilinear element.	
OHDOT Get View Rotation This MicroStation Visual Basic Application returns the view rotation angle for the selected view window.	
OHDOT Pavt Marking This application to assist the user with the placement of various chevron pavement marking options.	
OHDOT Geotechnical Report This MicroStation Visual Basic Application is used to generate a comma separated (CSV) file containing a list of the soil boring points found in the specified ORD Survey Field Book.	
OHDOT gINT Conversion This MicroStation Visual Basic Application is used to convert soil boring graphics exported from gINT into a DXF file to meet the CADD Standards required by the Geotechnical Drafting Guide.	
OHDOT gINT Summary Converter Used to convert CSV files	
OHDOT Rebar Chart This MicroStation Visual Basic Application is used to generate a rebar summary chart.	
OHDOT Existing Pipes This MicroStation Visual Basic Application is used to draw drainage pipes between two ORD Survey Points.	

OHDOT Rotate Survey Symbols This MicroStation Visual Basic Application is used to rotate selected ORD Survey points relative to a selected curvilinear element.	
OHDOT Geometry Points This application allows the user to review Geometry points and Survey points	

The Links Tab

Several links for various support resources are provided within OpenRoads on the **Links** tab in the **Ohio DOT WorkFlow**, which is selected from the WorkFlow menu at the upper left of the ORD interface.



6 MicroStation Design Files

This chapter discusses the way ODOT uses MicroStation design files with the OHDOT Standards.

Standard Design File Names

The **Location and Design Manual Volume 3, Section 1204.3.4 File Naming Conventions Figure 1204-1**, defines the standard MicroStation design file names to be used on all ODOT projects.

Example file name: 78086_BK001.dgn

- The standard design file names are to be used on all ODOT projects.
- Using the **OHDOT Create Design Files** application ensures that the file names and folder structure requirements are met.

Basemap and Sheet Design Files

For ODOT purposes, a MicroStation design file is typically used as either a **Basemap** design file, or a **Sheet** design file.

- **Basemap** design files are used to draw plan, profile, and cross section information for your project in real world dimensions.
- **Sheet** design files are used to assemble the plan sheets for the project.

In either case, the only real difference between a Basemap and a Sheet design file is the **Model** that is used within the design file to contain the information.

Basemaps and Sheets Sub-Folders

Basemap and Sheet design files are stored in separate folders for easier access when attaching reference files. For example, if the Right-of-Way designer wishes to reference the drainage basemap in his sheets he only needs to search the \400-Engineerng\Drainage\Basemaps folder for the drainage basemap rather than sort through all the sheet design files since they are contained in the \400-Engineering\Drainage\Sheets folder.

Several basemap design files may be used depending on the project complexity. The ODOT CADD Standards allow for multiple basemap design files for each unique discipline (drainage, lighting, mot, roadway, signals, etc…).

Models

A MicroStation design file is composed of one or more drawing areas called a **Model**. When users draw or place elements with MicroStation tools, the elements are added to the active Model.

- Design files can contain multiple models. Think of each model as a separate design within a design file.
- A Model can be either 2D or 3D. The same design file can contain both 2D and 3D models.
- 3D models can be referenced to 2D models, and vice versa.

- Each Model is a completely independent drawing area and has its own set of eight views, reference attachments, etc.; however, all models within the same DGN use the same color table, fonts, line styles, etc...

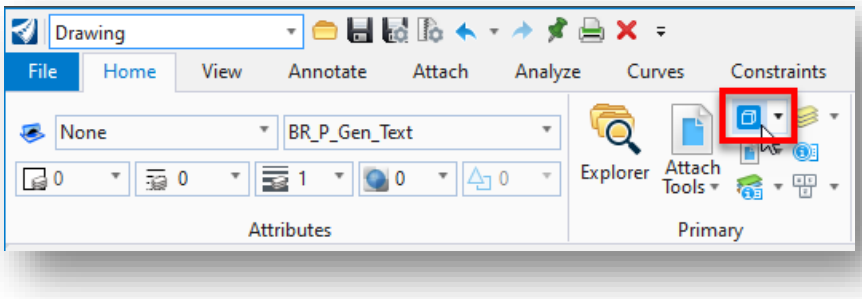
MicroStation provides three types of models:

- **Design** – This model type is used for creating design geometry that can be either 2D or 3D. By default, **Design** models have a black background.
- **Drawing** – This model type is used to reference the design models clipped to the limits of a sheet, and to place annotations, dimensions, and other callouts that will be referenced to a sheet model. A drawing model is always a 2D model. By default, **Drawing** models have a gray background.
- **Sheet** – The Sheet model is used to assemble the plan sheets for the project by referencing one or more of the drawing models and placing the sheet border in the sheet model. By default, **Sheet** models have a white background.

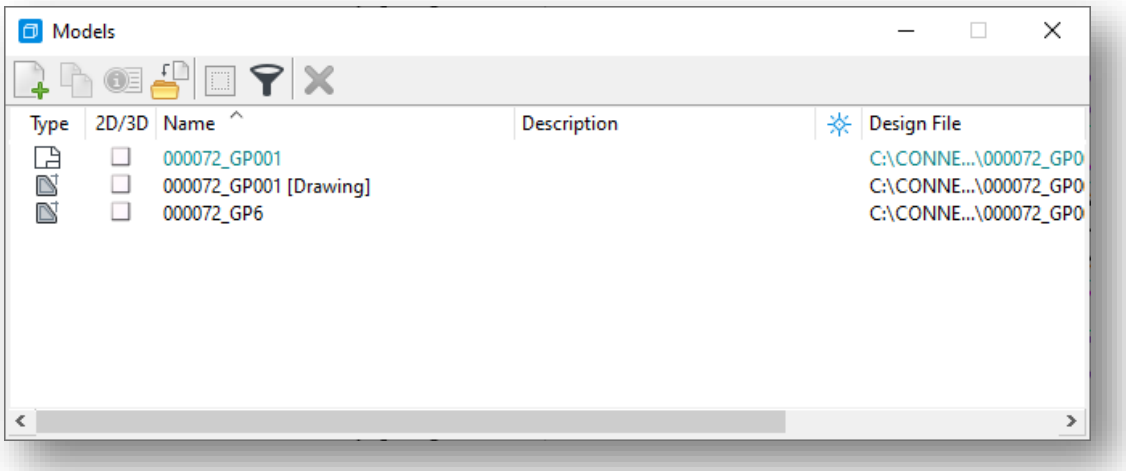
The Models Dialog

The *Models* dialog is used to manage and switch between models in the current MicroStation design file.

The **Models** icon is available on the **Home** tab in several of the WorkFlows within ORD.



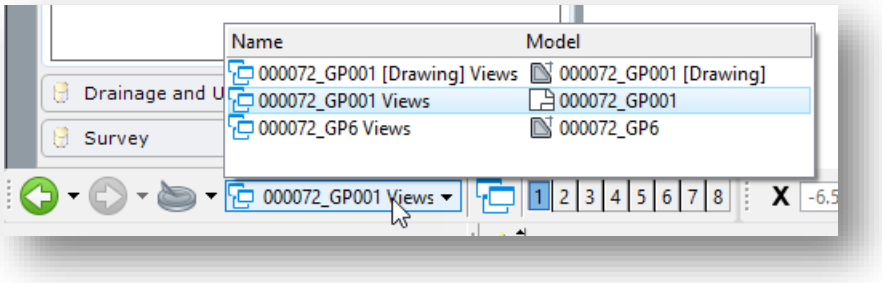
When the icon is selected, the dialog shown below is opened.



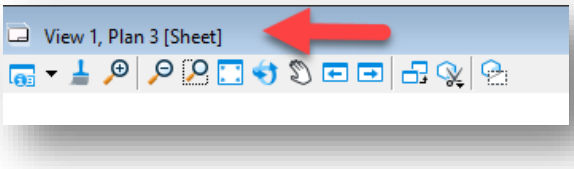
When a new MicroStation design file is created using one of the ODOT seed files, there is only one model contained in the file. The example above shows models that were generated using the ORD sheet clipping process.

To work with another model in the design file, you must activate it. Double-clicking the model's name within the ***Models*** dialog box makes the model active.

Alternatively, you can use the **View Groups** window to rapidly switch between models as shown below.



The name of the active model is also displayed in the **View** window title bar as shown below.



ODOT's use of Models

Models are used for ODOT plan preparation as follows:

- **Basemap** design files are used to draw the plan view graphics for the entire project in real world dimensions. The **Design Model** is used for this information.
- **Sheet** design files are used to assemble the plan sheets for a project. The plan sheet information is drawn in a **Sheet Model**.
- **Sheet** design files that are generated with ORD will use all three model types as follows:
    - A **Design** model is used to reference the various basemaps that will be shown on the completed sheets.
    - Multiple **Drawing** models are used to reference the **Design** model, and all its references. Each **Drawing** model is clipped to the limits that will be shown on the completed sheets. All annotations are placed in the **Drawing** model.
    - Multiple **Sheet** models are used to place the sheet borders and reference the **Drawing** models.

      See ODOT's ORD Training material for more information on sheet clipping using the ORD tools.

In previous versions of ODOT's seed files, the seed files contained two models, a design model, and a sheet model. With the OHDOT Standards, each seed file contains only one model. This change was made to accommodate the way the ORD Software uses the seed files to create sheets.

Design Model

When a new file is created using the seed files defined for the Workset, ######_DesignSeed2d or ######_DesignSeed3d files, the new file will contain only one model, the default design model named "Design". The design model is used for creating all design geometry in real-world dimensions.

- All basemap information is drawn in the default "Design" Model using real world dimensions at a 1:1 scale.
- All Line Styles and Cells drawn in the basemap design model shall be drawn at a scale of one (1). The Annotation Scale parameter is used to set the display size of cells, custom linestyles, text, and dimension elements.

Drawing Model

Drawing models are used in the ORD sheet clipping process. The drawing model contains references to the design model. These references are clipped to the limits that will be shown on the completed sheets. The intended workflow is for all sheet annotations to be placed in the drawing model.

Sheet Model

When a new file is created using the **OHDOT_SheetSeed2d** seed file, the new file will contain only one model named "Sheet". The sheet model is used to assemble plan sheets for plotting and PDF generation.

Based on the type of sheet to be built (title sheet, schematic sheet, etc.), a sheet border cell is placed in the "Sheet" model from the **OHDOT_Sheets.cel** cell library by use of the **OHDOT Sheet Cells** application.

If the user is manually assembling sheets, the design graphics are typically referenced from the basemap design file(s) to the sheet model. These references are then clipped, and annotations are added as needed. The "Sheet" model then contains a graphic representation of the final plan sheet and is ready to be plotted.

If the user is assembling sheets using the ORD sheet clipping process, the workflow will be different. This process will be utilizing the Drawing Model for annotations and will be referencing the Design Model the named boundary was placed with in the various Design models and using the Sheet model to place sheet borders which is then used to refence the Drawing model with the annotations. See ODOT's ORD training material for more information.

Using Multiple Sheet Models

The **Location and Design Manual Volume 3, Section 1204** contains information on the use of multiple models for ODOT projects.

In general, it is not permissible to use multiple models in a Basemap design file other than the models that are automatically generated using Bentley's OpenRoads Corridor Modeling tools. For example, it is not permissible to create a Basemap design file with one model containing the proposed plan view information and another model containing the proposed landscaping information. If the landscaping information is needed in a separate model, it should be housed in a separate design file as defined in the ODOT CADD Standards.

It is permissible to use multiple sheet models in a Sheet design file, within the guidelines established in the **Location and Design Manual Volume 3, Section 1204**.
To summarize

- ODOT allows only one plan sheet per sheet model in a sheet design file.
- Plan sheets of a like type can be separated into separate design files, or alternately separate sheet models within one design file.
- Multiple sheet models may be used within a sheet design file for multiple sheets of the same type. For example, it is not permissible to create a model for the General Notes and another model for the Typical Sections within the same design file.

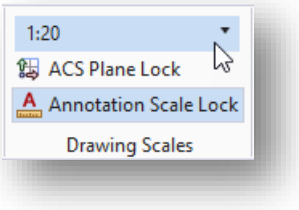
Model Annotation Scale

The Model **Annotation Scale** sets the proper display scale for all annotations placed in a Design, Drawing, or Sheet model. Any Text, Dimensions and Cells that are placed in the model are referred to as Annotations in MicroStation.

The **Annotation Scale** value can be set in the ***Properties*** dialog, or by use of the **Drawing Scales** group in the ribbon menu.

The **Drawing Scale** parameters are available in several WorkFlows within the ORD interface.

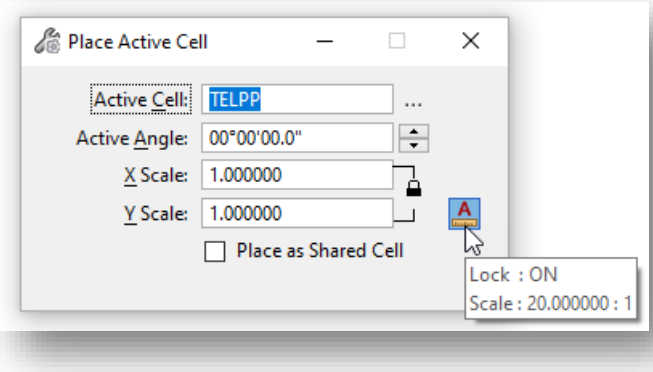
- Drawing > Utilities > Drawing Scale
- OpenRoads Modeling > Drawing > Drawing Scales
- OpenRoads Modeling > Drawing Production > Drawing Scales
- Survey > Drawing > Drawing Scales
- Survey > Drawing Production > Drawing Scales
- Subsurface Utilities > Drawing > Drawing Scales
- Subsurface Utilities > Drawing Production > Drawing Scales



The **Annotation Scale** parameter is a multiplier that is applied to the base size of an element when the element is placed. This allows elements to be displayed correctly at a variety of plotting scales.

Cells and Annotation Scale

When placing cells in the design, the **Annotation Scale** setting is used to control the size of the cells placed in the design. The **X Scale** and **Y Scale** parameters should always be set to a value of 1 as shown below.



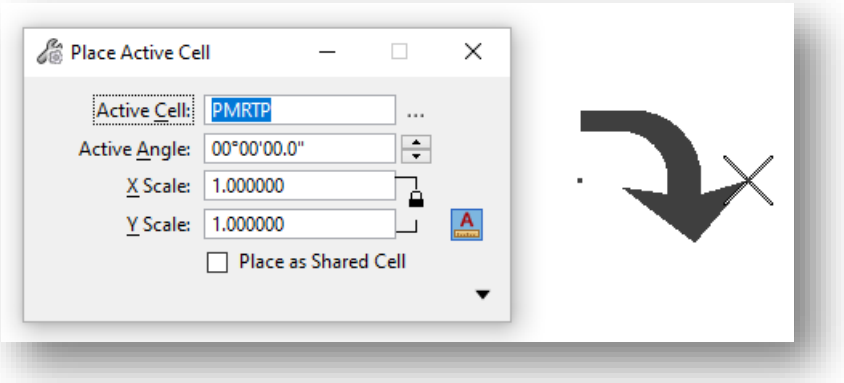
Cells should always be placed in the design with the **Annotation Scale Lock** toggled on as shown at left.

The **Annotation Scale** value is applied to the cell to determine the display size of the element within the file.

If the annotation scale is changed, the display of the cells is dynamically adjusted to reflect the changed value.

Some of the ODOT cells have been defined using the real-world dimensions of the item that they represent and cannot be scaled with the annotation scale setting. For example, pavement markings are placed at their real-world size and are not scaled according to the current **Annotation Scale** value.

In the example below, the cell **PMRTP** is placed at its actual size and is not scaled by the annotation scale parameter even though the annotation scale lock parameter is toggled on.



Cells that are defined using their real-world dimensions are referred to as **Physical** cells.

Cells that represent the location of an item, but not the actual size (such as a mailbox or telephone pole) are referred to as **Cosmetic** cells and are scaled by the annotation scale parameter.

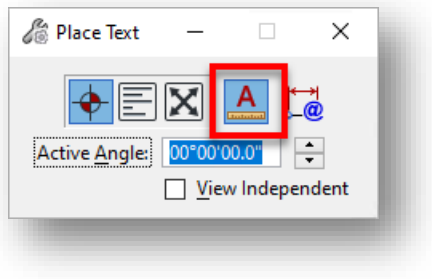
The cell definition itself within the cell library defines whether the display of the cell is affected by the annotation scale parameter.

Text Styles and Annotation Scale

When placing text in the design, a **Text Style** is used to define several parameters for text placement, including the text height, width, justification, font, line spacing, etc. The ODOT WorkSpace provides several test styles used in plan production as defined below.

MicroStation's **Annotation Scale** parameter is used to define the size of the text as placed in the design file relative to the intended plotting scale for the completed sheet. The Text Styles define the base text size for annotation. ODOT's standard text styles are defined with a base size of 0.14 master units. This size is equivalent to a 10-point font on the completed plan sheets.

When placing text, ensure the **Annotation Scale Lock** is toggled on as shown below.



With the **Annotation Scale** parameter toggled on, text is placed in the file using the current annotation scale value as a multiplier.

The base size (0.14) is multiplied by the current Annotation Scale value to define the height, width, and line spacing of the text as placed in the file. Changing the annotation scale will resize text elements. This applies to text contained in reference attachments.

OHDOTCEv01 Text Styles

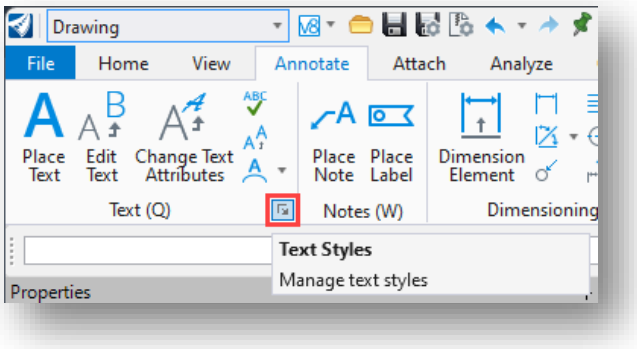
Text Styles in the OHDOTCEv01 WorkSpace are defined with font Arial for all the text styles. There is no differentiation between annotations of existing and proposed plan features.

OHDOTCEv02 Text Styles

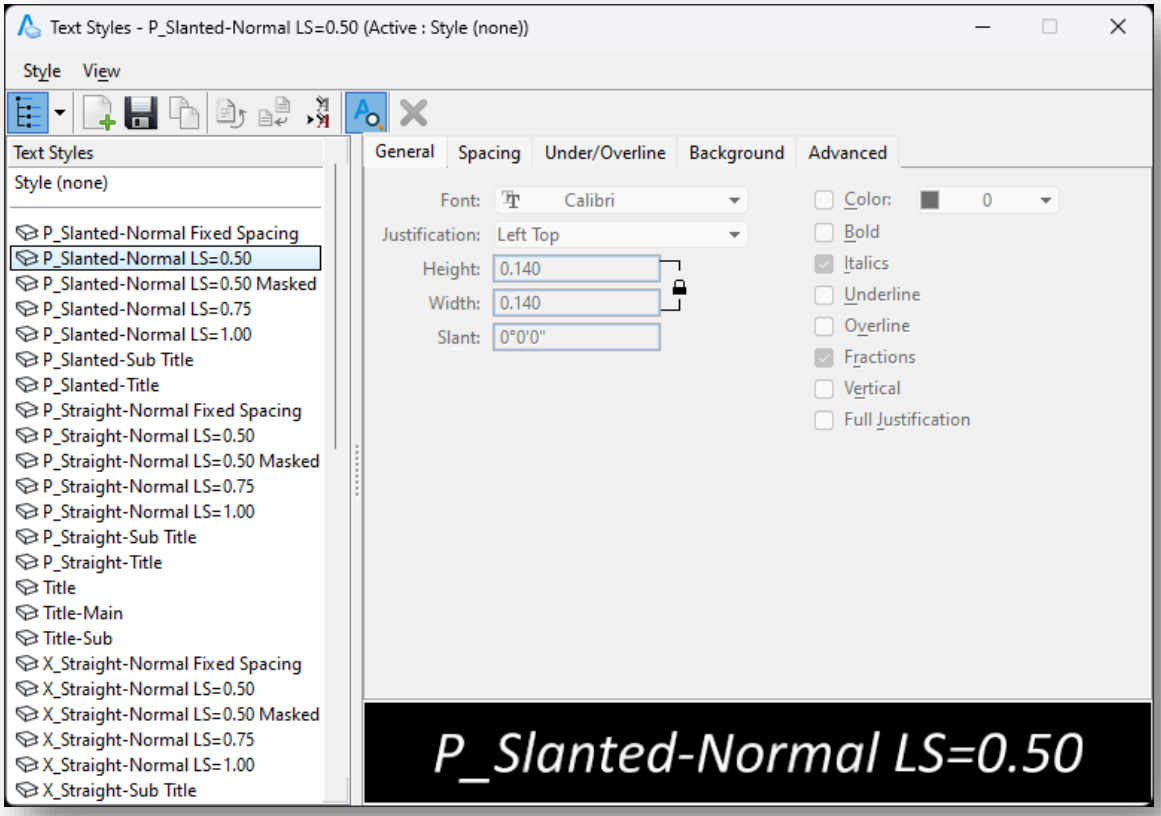
With the OHDOTCEv02 WorkSpace, ODOT is moving away from using font Aerial as the primary font for plan production use to fonts Calibri and Calibri Light. This was done to provide clear differentiation between labels for existing and proposed items. Existing items are annotated with Font Calibri Light. The proposed items are annotated with the font Calibri Italic.

The text styles in the ODDOTCEv02 WorkSpace have been renamed to accommodate these changes.

The available Text Styles can be reviewed by selecting the icon in the lower right corner of the Text group, as shown below.



The Text Styles dialog shown below is opened.



The text styles in the OHDOTCEv02 WorkSpace are defined for use with various ORD software annotation functions as described below.

- Text styles named with the prefix "**P_**" are used for the annotation of proposed items. These text styles are defined to use the font Calibri with the Italics option toggled on.

  P_Slanted-Normal LS=0.50

- Text styles named with the prefix "**X_**" are used for the annotation of existing items. These text styles are defined to use the font Calibri Light with the Italics option toggled off.

X_Straight-Normal LS=0.50

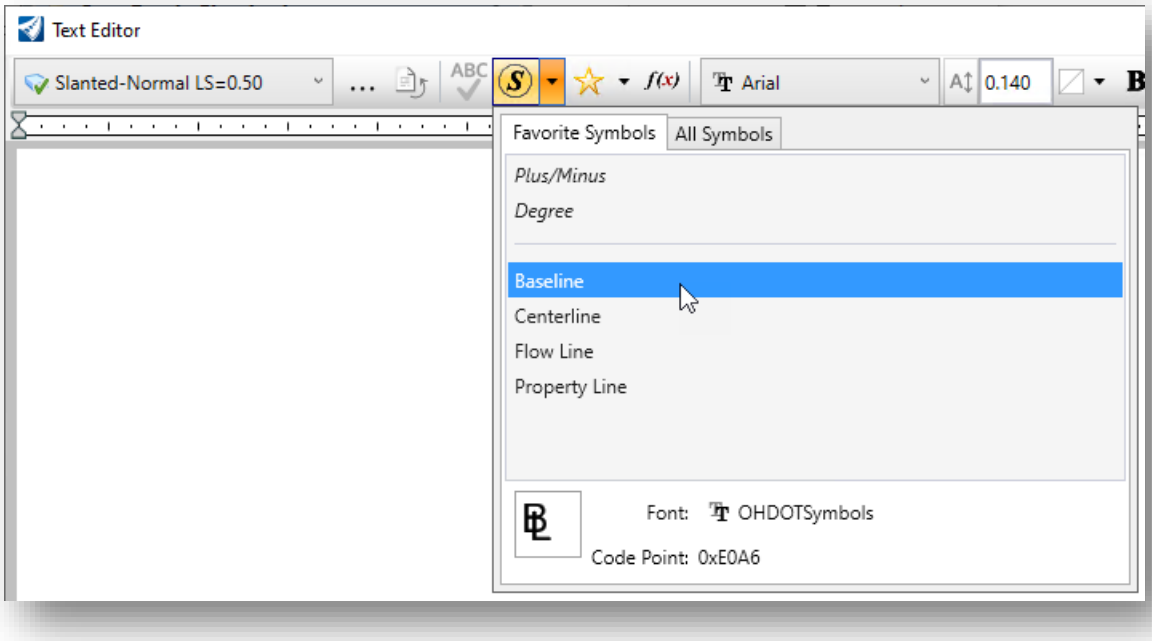
- Text styles named with the prefix "**~P_Label**" "**~X_Label**" are used in various ORD annotation definitions and are not typically used when placing text. The tilde (~) character was added to the prefix so that these text styles sort last in the list.

Text Symbols (Special Characters)

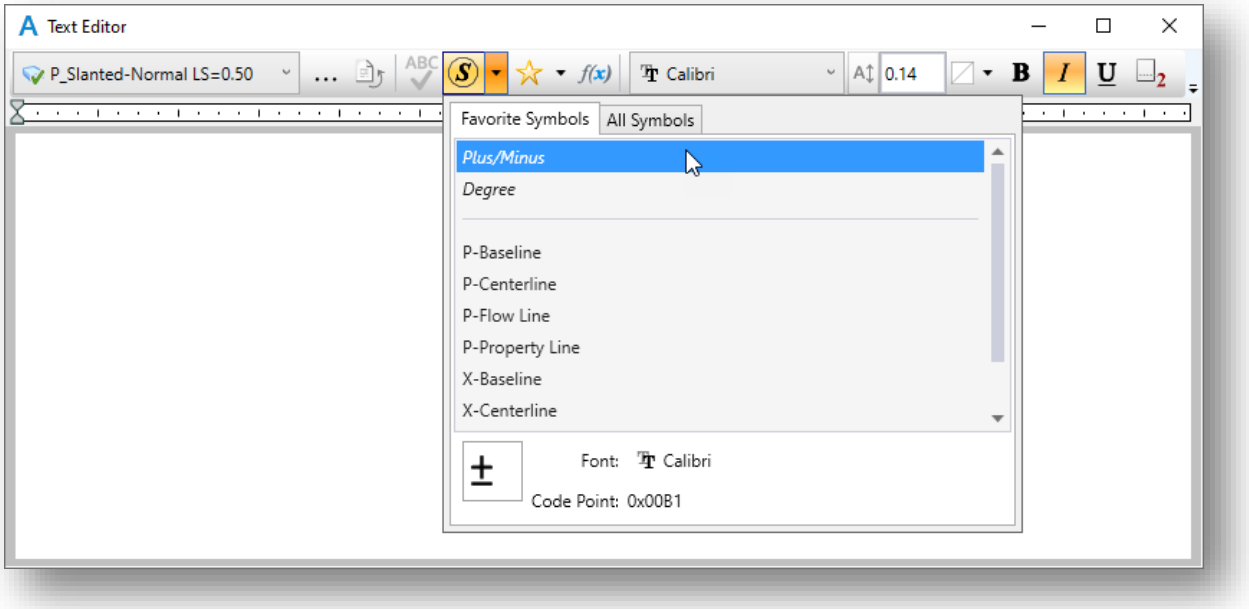
Engineering documents commonly use special characters for annotations such as a Center Line (CL) or Baseline (BL) character. These characters are not defined in a standard True Type font such as Calibri. ODOT's WorkSpace provides symbol fonts used to define these common engineering characters.

To insert a symbol in the text, simply select if from the **Favorite Symbols** list when placing text using the **Place Text** command.

The **Favorite Symbols** defined in the **OHDOTCEv01** WorkSpace are shown below:



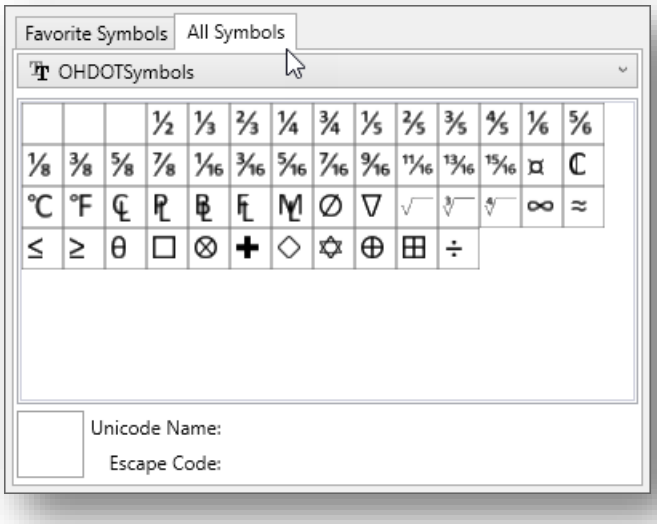
The available special characters have been expanded for the OHDOTCEv02 WorkSpace to include options for the annotation of existing and proposed features, as shown below.



- Characters have been defined for the annotation of existing items using a straight symbol based on font Calibri Light and named with an “X-” prefix.

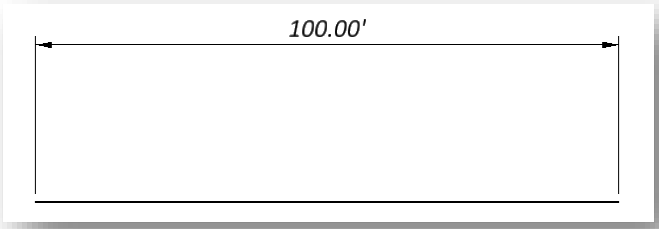
- Characters have been defined for the annotation of proposed items using a straight symbol based on font Calibri Italic and named with an “P-” prefix.

Select **All Symbols** to display all the symbols available in the selected font. The special characters that have been defined for the OHDOTVEv02 WorkSpace are shown below.

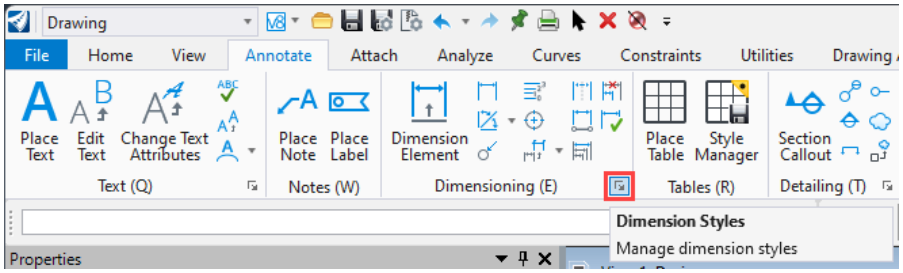


Dimension Styles

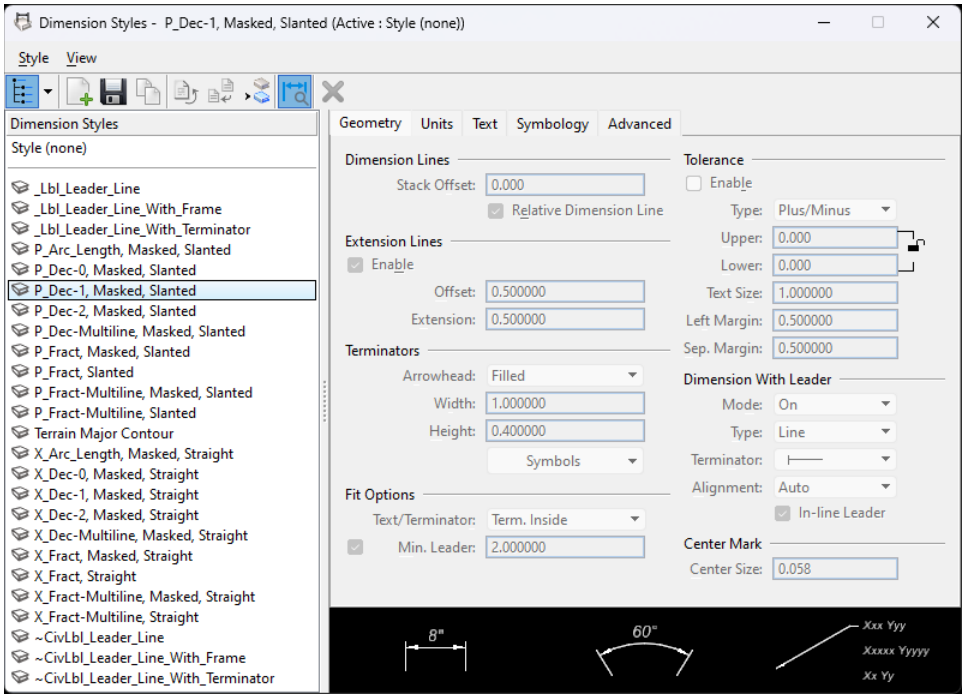
Dimension Styles are used to define the default parameters for use on ODOT plans. These parameters include settings for the dimension lines, arrow heads, and text styles. An example of a linear dimension using the OHDOTCEv02 Standards is shown below.



The available dimension styles can be reviewed by selecting the **Manage dimension styles** icon in the lower left of the **Dimensioning** group as shown below.



The ***Dimension Styles*** dialog is opened.



The settings above list the Dimension Styles available in the OHDOTCEv02 WorkSpace.

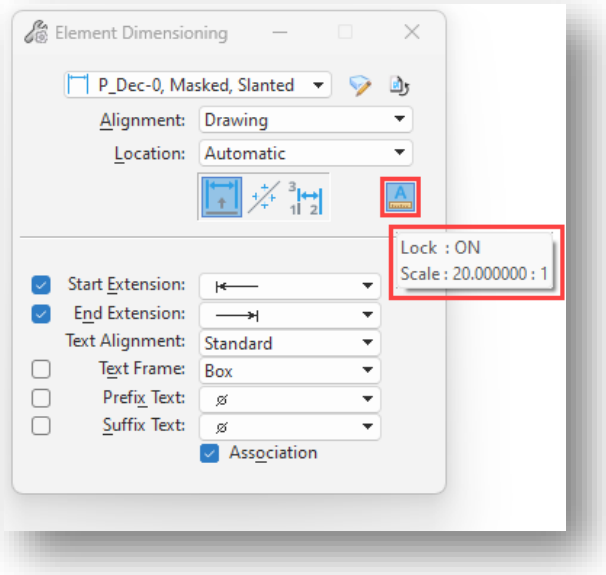
The following dimension styles are defined for ORD annotation functions and are not intended to be selected by the user when placing dimensions:

- _lbl_Leader_Line
- _lbl_Leader_Line_With_Terminator
- Terrain Major Contour
- ~CivlLlb_Leader_Line
- ~CivilLbl_Leader_Line_With_Frame
- ~CivilLbl_Leader_Line_With_Terminator

Like text and cells, MicroStation dimension elements are placed using the **Annotation Scale** parameter.
When placing dimension elements, the **Annotation Lock** should be toggled on as shown at right.

When a dimension is placed in the file, the text is placed at the height and width defined for the dimension style (typically 0.14). The initial size is then multiplied by the current **Annotation Scale** value to determine the displayed size of the text element.

Changing the current **Annotation Scale** value will change the display size of the dimension element appropriately.

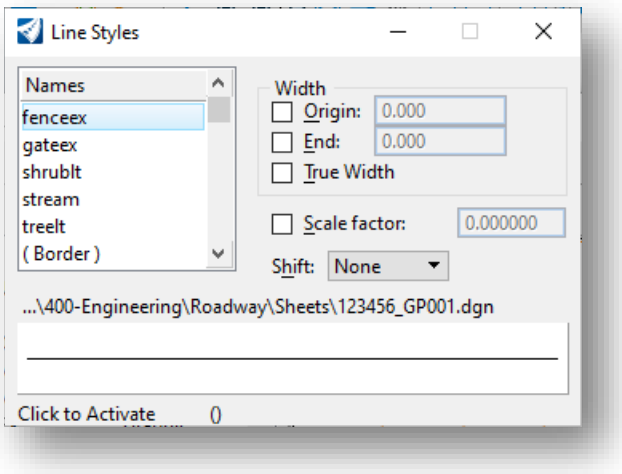


Custom Line Styles and Annotation Scale

Just like text, cells, and dimensions, ODOT's custom line styles are placed in the design file using a base scale value appropriate for a 1:1 scale drawing which is then multiplied by the **Annotation Scale** for the intended plotting scale.

When curvilinear elements are drawn using a custom line style, the scale value set in the ***Line Styles*** dialog is used to determine the initial placement size of the custom line style.

Select **File > Settings > File > Line Style Settings** to access the ***Line Styles*** dialog shown below.



The **Scale Factor** item is used to set the initial placement value. If this item is toggled off, as shown at left, a value of 1 is assumed.

- ODOT's Custom Line Styles have been created at a 1:1 scale so they are scaled to the appropriate sheet scale.

- Some of the custom line style definitions are defined as **Physical** line styles, representing real world dimensions, and are not scaled when placed, while others are **Cosmetic** representations of elements used to designate the location of the feature, but not the size.

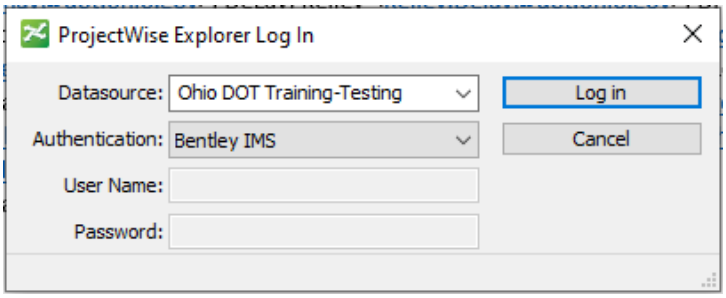
  For example, the custom line style for a pavement marking lane line is defined at the actual dimensions of the dash and gap lengths. When the lane line graphics are placed, the current annotation scale value does not impact on the length of the dash and gap. Conversely, the custom line style for a fence line is scaled by the annotation scale parameter to be readable on the plan.

  The definition of the custom line style itself, within the line style library, defines whether an individual line style represents a cosmetic or physical element.

Exercise: Models and Annotation Scale

In this exercise we will explore how the annotation scale is set in the survey basemap and how it can be controlled by the reference file attachments independently from the value set in the survey file.

- Open ProjectWise Explorer if it is not currently open.
- When prompted, sign into ProjectWise as shown below.



- Browse to the sample project to open the file listed below.

  ..\IntroToMicroStationTraining\78086\300-Survey\Basemaps\78086_FB001.dgn

  There are a few things to note about this file:

  - This is a Survey file. If you are not a member of the Survey group, the file is opened Read-Only.
  - This file was generated using the OpenRoads Survey tools and is a 3D file.
  - The Terrain Model, which represents the existing ground surface, is an element in the design file.
  - The terrain model is linked to the survey graphics. Editing the design file graphics can result in unwanted edits to the terrain model. Therefore, it is suggested that the designers do not make graphical edits in the survey file without consulting the survey personnel.

  The graphics contained in a Survey basemap generated with the OpenRoads Survey tools are Annotation Scale aware. Changing the annotation scale value will change the display size of cells, text, and the custom line styles in the file.

Take the following steps to observe the annotation scale behavior:

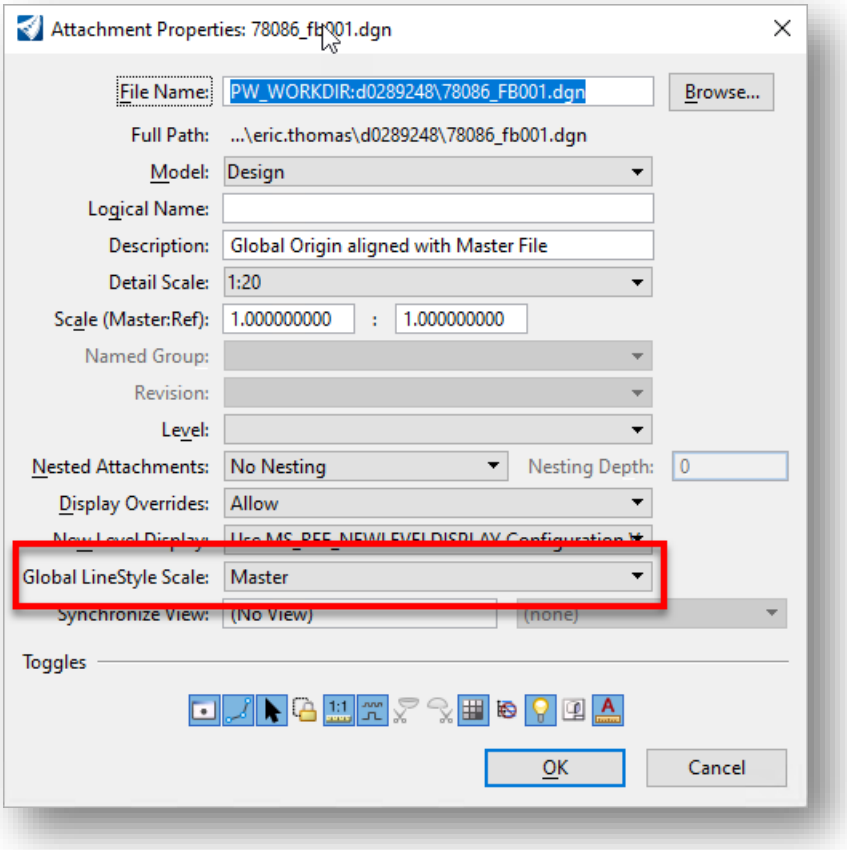
- ✓ Change the current annotation scale value to 1:50. Note the changes to the design file graphics.
- ✓ Open the Geometry Basemap from the following location:

..\IntroToMicroStationTraining\78086\400-Engineering\Basemaps\78086_BK001.dgn

✓ Review the attached references.

- From the **Drawing** Workflow, select **Home > Attach Tools > References** to open the ***References*** dialog.

- The Survey Basemap design file, 78086_FB001.dgn, is already attached as a reference file. In the ***References*** dialog, right-click on the survey basemap and choose the **Settings** option. The ***Attachment Settings*** dialog shown below is opened.

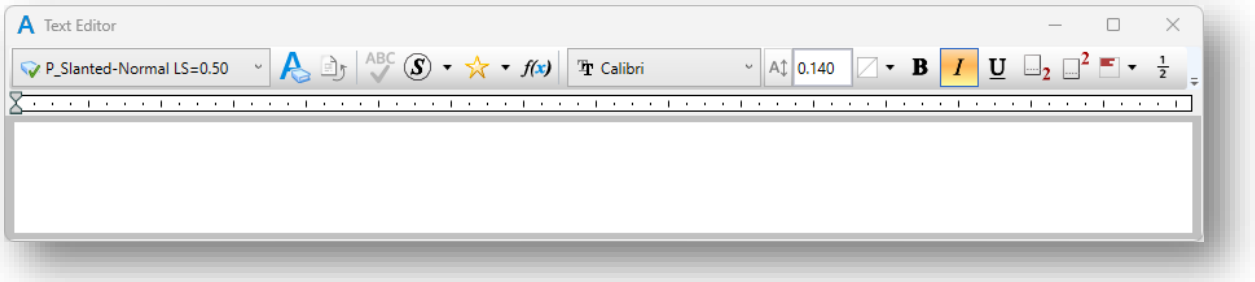


The **Global LineStyle Scale** option is used to control how line styles are displayed for the selected reference attachment. In the example above, the reference attachment is set to **Master**. This setting allows the active design file to control the scale appearance of cosmetic linestyles elements in the reference attachment. Choose the **Cancel** button to close the dialog without making any changes.

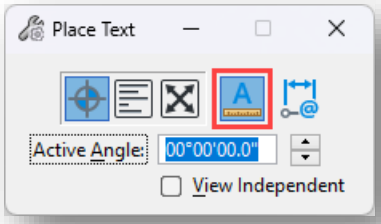
✓ Change the **Annotation Scale** setting to **1:10** in the active file. The display of the text, cells, and custom line styles is changed independently of the setting defined in the original Survey basemap.

Next, we'll place text to illustrate how the annotation scale is applied to the text elements.

- ✓ Change the active level to **SC_Scratch1**
- ✓ Select the **Place Text** command (**Drawing** > **Annotate** > **Place Text**) to place some text in the design file.

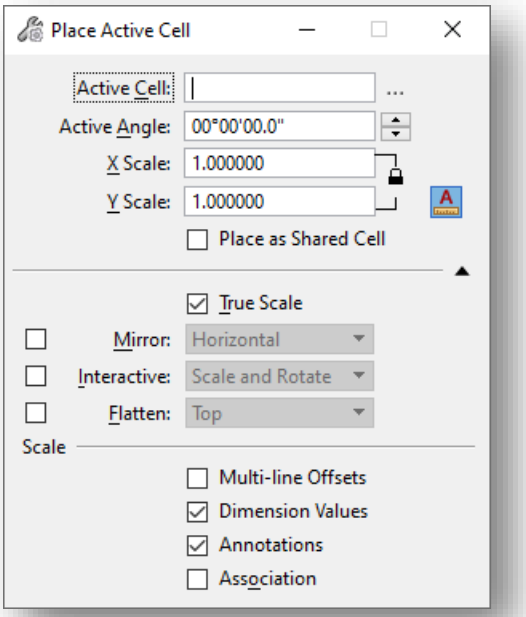


- ✓ Select the **P_Slanted-Normal LS=0.50** text style from the drop-down list in the upper left of the ***Text Editor*** dialog. The font defaults to **Calibri Italic** with a text size of **0.14**.
- ✓ In the tool settings dialog, ensure the **Annotation Scale Lock** is toggled on as shown below.



- Place multiple text elements in the file.
- After placing the text, change the annotation scale value (**Drawing > Utilities > Drawing Scale**). Notice that the text elements are scaled about the individual element's origin. Depending on the annotation scale value, this may result in overlapping text elements.

Next, we'll place a few cells in the file.



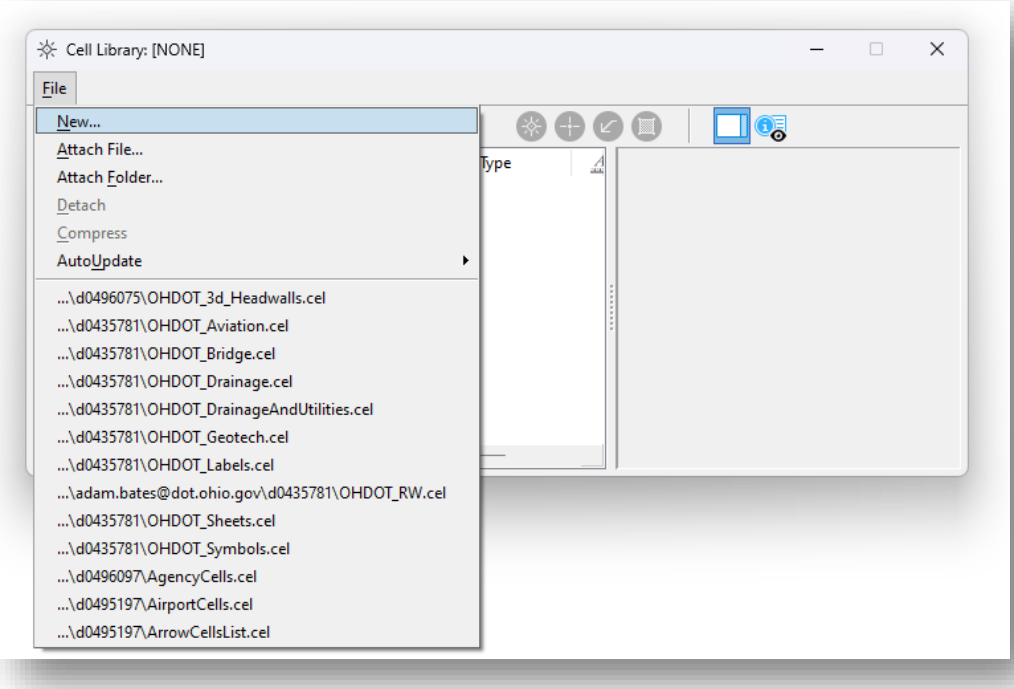
- ✓ Select the **Place Active Cell** command (**Drawing > Home > Placement > Place Active Cell**)

  Cells are stored in a library. ODOT maintains several libraries in the CADD Standards.

- ✓ Select the **Browse** button, to the right of the **Active Cell** key-in field, to browse ODOT's cell libraries.

  The ***Cell Library*** dialog, shown below, is opened.

- ✓ Select the **File** menu to view a list of the cell libraries that are available in the OHDOT CADD Standards. The cells are separated into discipline specific libraries.



- ✓ Select the **OHDOT_Symbols** cell library from the list to view the cells that are available in the library.

- ✓ Place the following cells in the DGN, making sure the **Annotation Scale Lock** is toggled on.
  - AC AIR CONDITIONER EX
  - BBQ STATIONARY BARBEQUE GRILL EX
  - MBP MAILBOX PR
  - PMLT PVT MRK LEFT-THRU TURN ARROW EX

- ✓ After placing the cell, change the annotation scale value (**Drawing > Utilities > Drawing Scale**).

  Notice that the cells AC, BBQ, and MBP are scaled about the individual element's origin. These cells are defined to represent the location of the feature, but not the actual size of the feature. The cells are scaled to maintain readability on various plan sheets at different scale values.

  The cell PMLT is an example of a cell that is created using the real dimension of the cell and will always be displayed at its actual size.

Lastly, we'll draw a few lines in the file using a custom line style.

- ✓ Set the active level (**Drawing > Home > Attributes > Level**) to the levels below and draw a line or line string (**Drawing > Home > Placement > Place SmartLine**) on each level.
  - RD_X_Fence
  - PM_X_Lane_Line

- ✓ After the graphics have been drawn, change the annotation scale value (**Drawing > Utilities > Drawing Scale**)

  The lines drawn on the PM_X_Lane_Line level are not scaled. Pavement marking lines are an example of a line style type that has been defined using its actual dimensions and therefore is not scaled when the annotation scale value is changed.

  The fence line is scaled as the annotation scale value is changed. The "X" symbol displayed along the fence line, and the spacing, is scaled to be readable at a variety of plan scales but does not represent the physical location of fence posts.

- ✓ Change the annotation scale setting back to **1:20** at the completion of this exercise.

- ✓ Exit OpenRoads by selecting **File > Exit**.

- ✓ When prompted, check the file back in to ProjectWise.

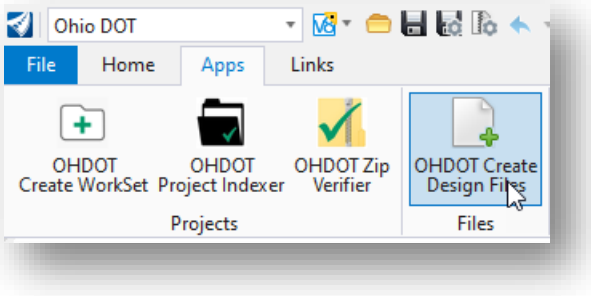
7 Creating Design Files

ODOT's CADD Standards specify the use of multiple design files for a typical ODOT project to federate the data so that it can be accessed by multiple users simultaneously. Each design file for the WorkSet is given a unique name according to the ODOT CADD Standards. Additionally, when a new file is created, there are several parameters that must be properly defined for ODOT projects, summarized below:

- Seed files are used as a template for new files as the files are created. The seed files set various parameters according to the ODOT CADD Standards as well as project specific standards. When creating new design files, users must ensure that the correct Seed File is used for the new design file (2D, 3D) using the appropriate Geographic Coordinate System (GCS) for the project.
- As new files are created, care must be taken to ensure that each file is created in the appropriate sub-folder within the OHDOT folder structure.
- Files must be named according to the ODOT CADD Standards. See the **Location and Design Manual Volume 3, Section 1204.3.4** for more information.
- Annotation Scale is set appropriately for the content.
- The **Title** and **Comments** file properties can be used to provide information about the design file contents.

OHDOT Create Design Files

ODOT provides a custom application to assist with the creation of MicroStation design files using the proper file naming convention and assigning the various parameters detailed above. The program can be accessed from the OHDOT WorkFlow by selecting **Ohio DOT > Apps > OHDOT Create Design Files**.



Information about the program can be accessed by selecting the **Help** icon in the upper right corner of the dialog. Before creating design files, we'll discuss a few of the items in the bullet list above.

Seed Files

When the WorkSet is created, seed files are created for the WorkSet in the following folder:

..\990-WorkSet Standards\Seed\

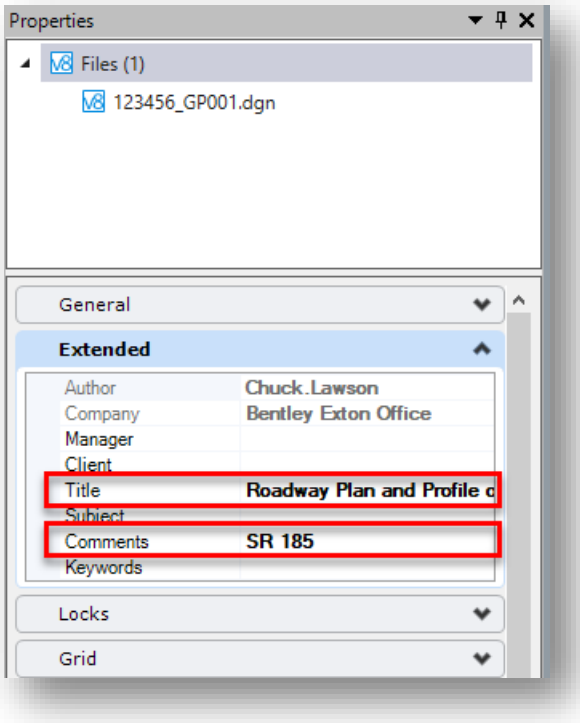
These seed files are defined with the GCS for the project and are to be used when creating design files for the WorkSet. The OHDOT Create Files application defaults to the correct seed file for each design file type (Basemap or Sheet) that is created.

Title and Comments Properties

The **Title** and **Comments** file properties may be used by ODOT personnel to add additional information about the design file contents that can be displayed in ProjectWise Explorer. The use of these properties is optional.

The file properties are assigned when a design file is created using the **OHDOT Create Design Files** application and can also be assigned manually in MicroStation.

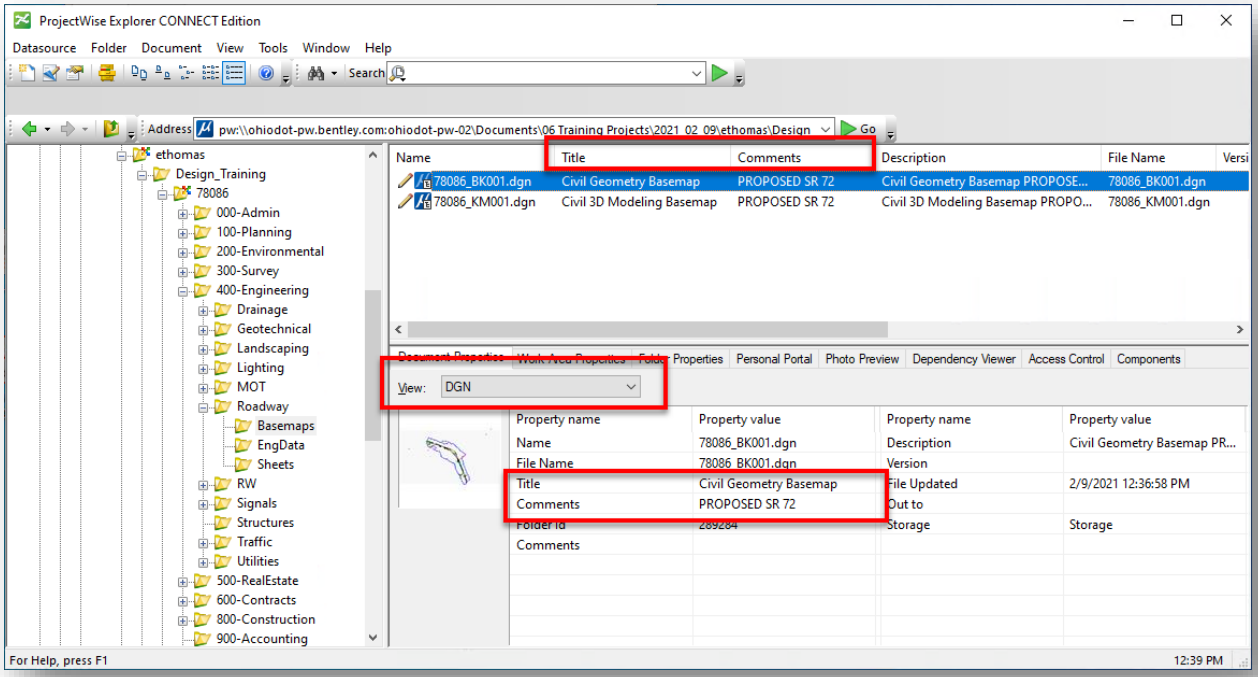
To edit the file properties in MicroStation, select **File > Properties** to access the *Properties* dialog shown below. Select the **Extended** tab to review or edit the **Title** and **Comments** properties.



The **Title** property is typically used to define the file type.

The **Comments** property is typically used to define the file contents.

These properties can be reviewed from the ProjectWise Explorer dialog as shown below.



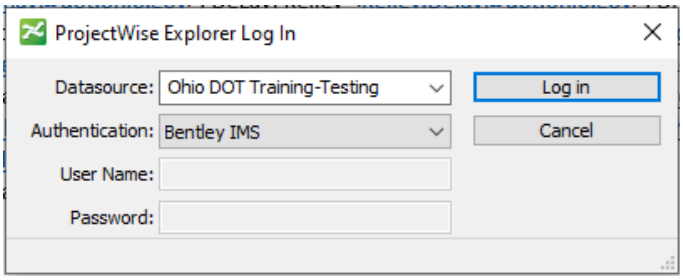
The order of the headings (**Name**, **Description**, etc.) can be modified by dragging the heading to the preferred order. In the example above, the **Title** and **Comments** fields have been moved adjacent to the **Name** field.

The **Title** and **Comments** fields can also be reviewed by changing the **View** parameter, located in the center of the dialog, to **DGN** as shown above.

Exercise: OHDOT_CreateFiles

In this exercise we'll create new design files for the sample project using the OHDOT_CreateFiles application.

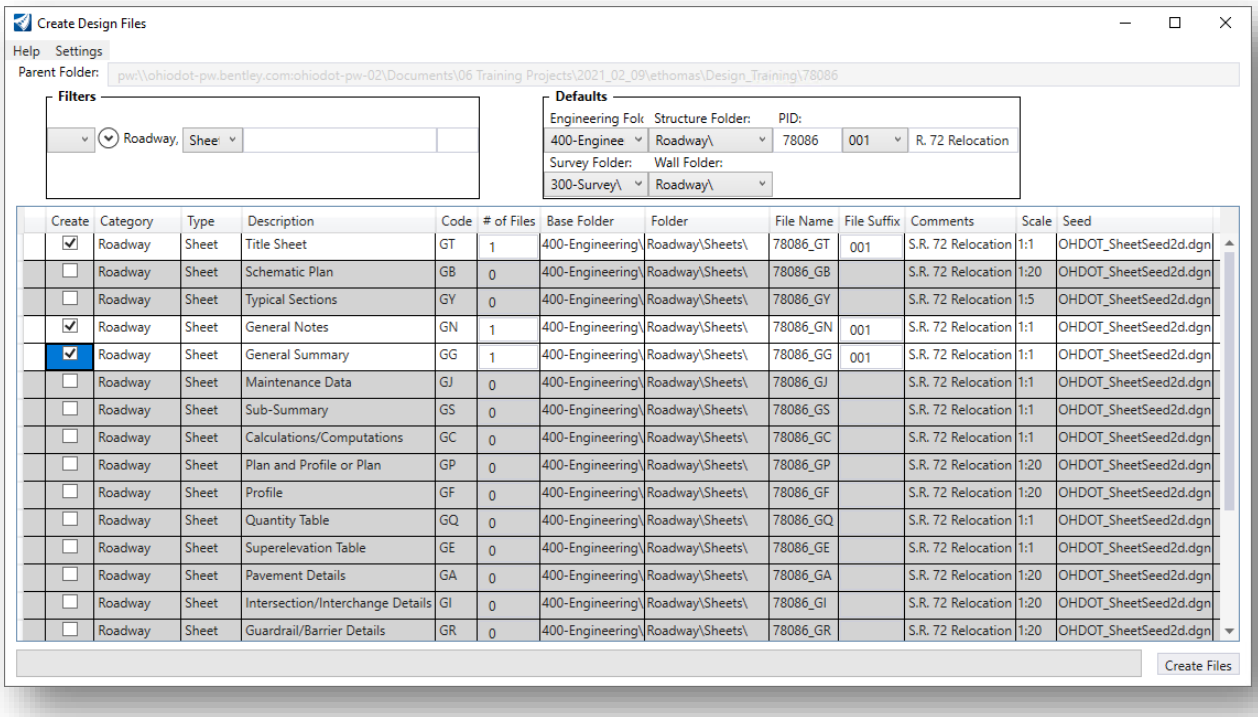
- Open ProjectWise Explorer if it is not currently open.
- When prompted, sign into ProjectWise as shown below.



- Browse to the sample project to open the file listed below.

..\ IntroToMicroStationTraining\78086\400-Engineering\Basemaps\78086_BK001.dgn

✓ Open the **OHDOT Create Design Files** application (**Ohio DOT > Apps > OHDOT Create Design Files)**



Create	Category	Type	Description	Code	# of Files	Base Folder	Folder	File Name	File Suffix	Comments	Scale	Seed
☑	Roadway	Sheet	Title Sheet	GT	1	400-Engineering\	Roadway\Sheets\	78086_GT	001	S.R. 72 Relocation	1:1	OHDOT_SheetSeed2d.dgn
☐	Roadway	Sheet	Schematic Plan	GB	0	400-Engineering\	Roadway\Sheets\	78086_GB		S.R. 72 Relocation	1:20	OHDOT_SheetSeed2d.dgn
☐	Roadway	Sheet	Typical Sections	GY	0	400-Engineering\	Roadway\Sheets\	78086_GY		S.R. 72 Relocation	1:5	OHDOT_SheetSeed2d.dgn
☑	Roadway	Sheet	General Notes	GN	1	400-Engineering\	Roadway\Sheets\	78086_GN	001	S.R. 72 Relocation	1:1	OHDOT_SheetSeed2d.dgn
☑	Roadway	Sheet	General Summary	GG	1	400-Engineering\	Roadway\Sheets\	78086_GG	001	S.R. 72 Relocation	1:1	OHDOT_SheetSeed2d.dgn
☐	Roadway	Sheet	Maintenance Data	GJ	0	400-Engineering\	Roadway\Sheets\	78086_GJ		S.R. 72 Relocation	1:1	OHDOT_SheetSeed2d.dgn
☐	Roadway	Sheet	Sub-Summary	GS	0	400-Engineering\	Roadway\Sheets\	78086_GS		S.R. 72 Relocation	1:1	OHDOT_SheetSeed2d.dgn
☐	Roadway	Sheet	Calculations/Computations	GC	0	400-Engineering\	Roadway\Sheets\	78086_GC		S.R. 72 Relocation	1:1	OHDOT_SheetSeed2d.dgn
☐	Roadway	Sheet	Plan and Profile or Plan	GP	0	400-Engineering\	Roadway\Sheets\	78086_GP		S.R. 72 Relocation	1:20	OHDOT_SheetSeed2d.dgn
☐	Roadway	Sheet	Profile	GF	0	400-Engineering\	Roadway\Sheets\	78086_GF		S.R. 72 Relocation	1:20	OHDOT_SheetSeed2d.dgn
☐	Roadway	Sheet	Quantity Table	GQ	0	400-Engineering\	Roadway\Sheets\	78086_GQ		S.R. 72 Relocation	1:1	OHDOT_SheetSeed2d.dgn
☐	Roadway	Sheet	Superelevation Table	GE	0	400-Engineering\	Roadway\Sheets\	78086_GE		S.R. 72 Relocation	1:1	OHDOT_SheetSeed2d.dgn
☐	Roadway	Sheet	Pavement Details	GA	0	400-Engineering\	Roadway\Sheets\	78086_GA		S.R. 72 Relocation	1:20	OHDOT_SheetSeed2d.dgn
☐	Roadway	Sheet	Intersection/Interchange Details	GI	0	400-Engineering\	Roadway\Sheets\	78086_GI		S.R. 72 Relocation	1:20	OHDOT_SheetSeed2d.dgn
☐	Roadway	Sheet	Guardrail/Barrier Details	GR	0	400-Engineering\	Roadway\Sheets\	78086_GR		S.R. 72 Relocation	1:20	OHDOT_SheetSeed2d.dgn

✓ Under the **Filter** group at the talk of the dialog, select the **Roadway** category and the Sheet option. The dialog is updated to display only Roadway Sheet file types.

- ✓ Under the **Defaults** category at the top of the dialog, key in a default comment of "**S.R. 72 Relocation**".

- ✓ Toggle on the Create option for the following file types:
  - Title Sheet
  - General Notes
  - General Summary

- ✓ Select the **Create Files** item to create the files. Note the file names and the folder where the files are created.

Next, we'll create some drainage sheets for the example project.

- ✓ Change the filters, at the top left portion of the dialog, to display **Drainage Sheets**.

- ✓ Create the files listed below. Pay attention to the **Scale** setting.
  - Schematic
  - Notes
  - Sub-Summary
  - Quantity Table

- ✓ Note the folder that is used for the drainage files is not the same folder location that was used for the general Roadway files.

- ✓ This completed this exercise. Exit OpenRoads by selecting **File > Exit**.

- ✓ When prompted, check the file back in to ProjectWise.

8 Sheet Design Files and Sheet Cells

Sheet borders for ODOT plans are defined as MicroStation Cells. These cells are contained in the following cell library:

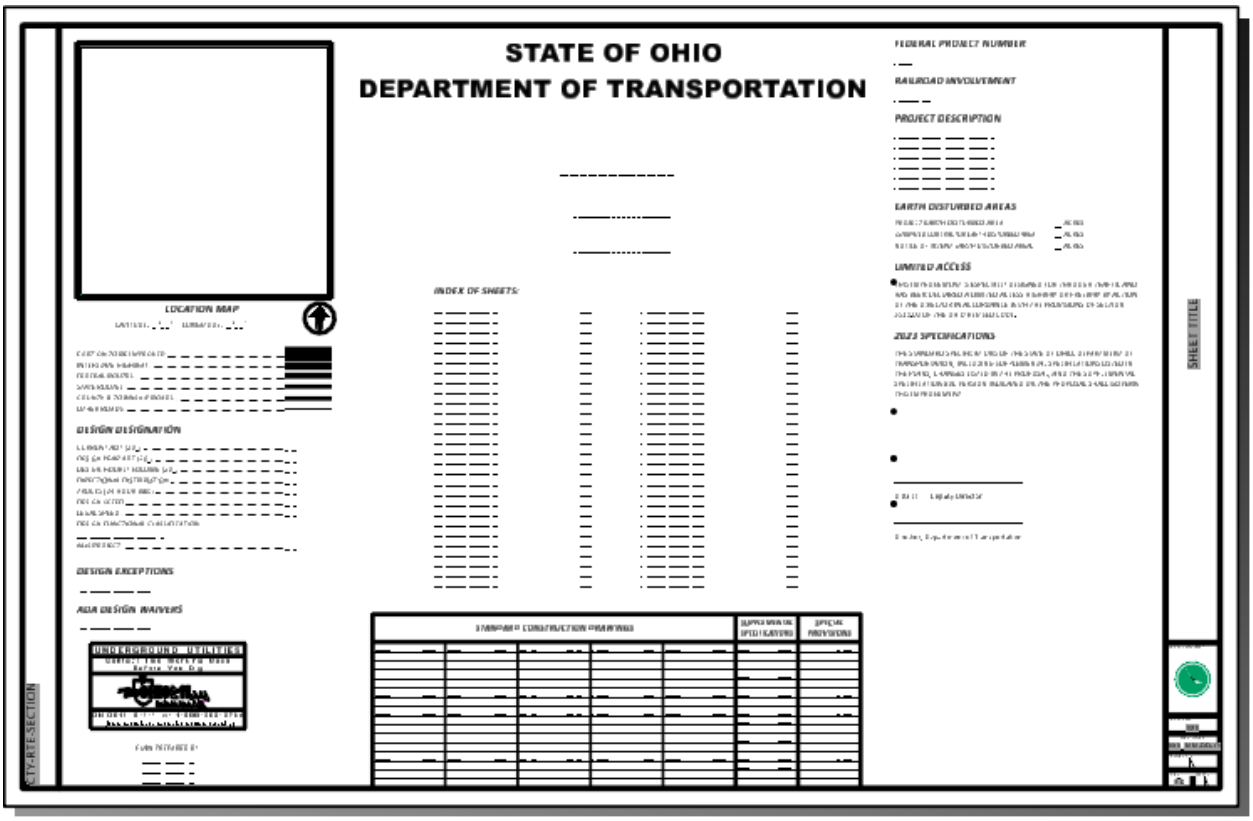
...\OHDOTCEv02\Standards\cell\OHDOT_Sheets.cel

With the OHDOT CADD standards, three major changes have been made to ODOT's plan sheet borders:

- The title block information has been simplified to use less parameters.
- The look of the sheets borders has been modernized for electronic viewing.
- MicroStation **Item Types** replace the use of **Tags** for the title block information.

These changes provide significant enhancements to the way ODOT manages the sheet title information.

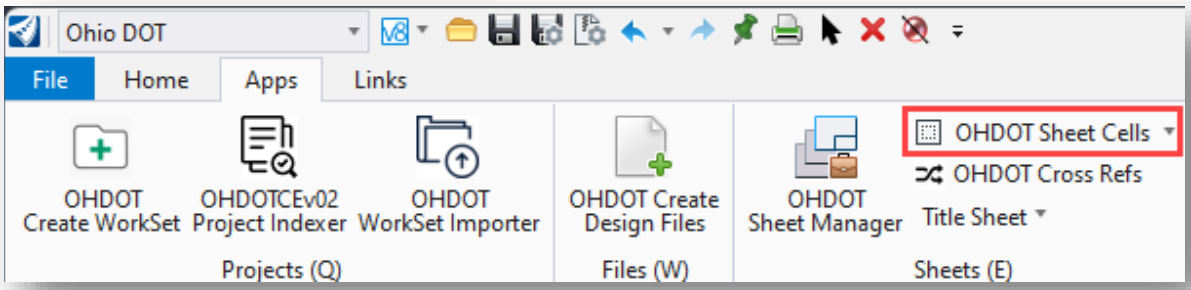
An example of the OHDOT Title Sheet cell is shown below.



Placing Sheet Cells

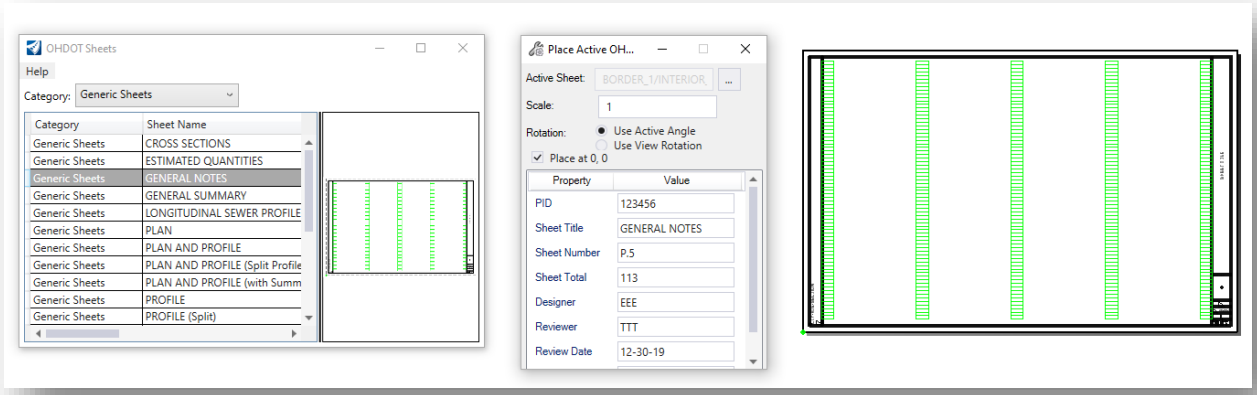
Sheet cells are placed in a sheet design file. The sheet design files are created using the **OHDOT Create Design Files** application as detailed in Section 7 of this document.

When the sheet design file is created, the current release of the **OHDOT Create Design Files** application does not place a sheet border in the file. Users must place the sheet border using the **OHDOT Sheet Cells** application.



Cells that have interior components, such as the title sheet, are split into two separate cells: one for the border and one for the interior. Placement of the sheet cell border and interior is facilitated by use of the **OHDOT Sheet Cells** application.

In the example below, a General Note sheet border is placed with the interior cell defining the note columns. The parameters for the various sheet title block attributes are entered in the ***Tool Settings*** dialog as shown below.



The OHDOT sheet seeds files, which are used as the seed file when the sheet design file is created, are configured with the **Show Sheet Boundary** parameter set to a value of **True**. The boundary can be used for the sheet border placement by snapping to the lower left corner of the boundary. In the example above, the sheet is placed at the (0,0) coordinate location using the **Place at 0,0** option.

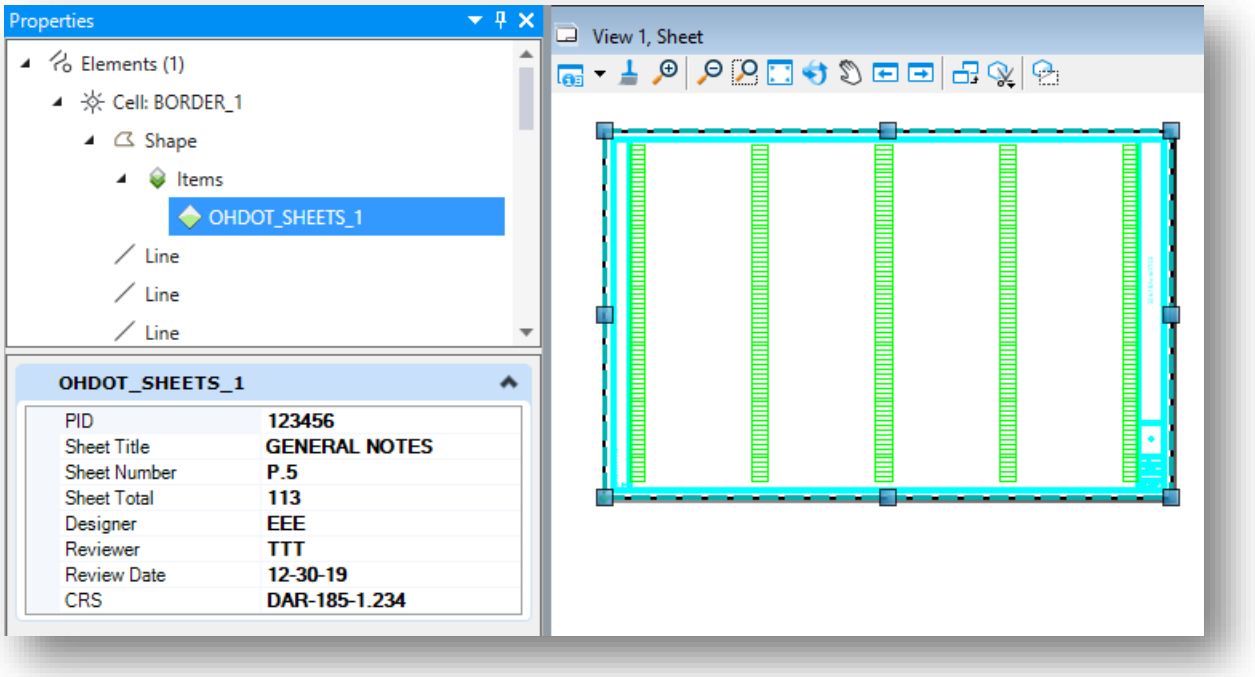
For more information about the application, choose the **Help** option.

MicroStation Item Types

Item types are a user defined set of properties used to describe an object or element. Item types are assigned to elements in the MicroStation file. The OHDOT sheet border cells use Item Types to define the values for sheet parameters, such as the Sheet Title, Sheet Number, Sheet Total, etc.

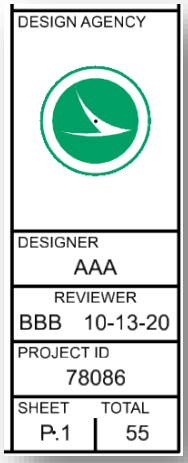
Most ODOT users are unfamiliar with MicroStation Item Types. This section will present some general information about item types and how they are defined and assigned. For additional information, see the MicroStation online help.

In the OHDOT implementation, the item types are assigned to the cut-line element of a sheet cell. In the example below, the sheet border is selected, and the Item Type named "**OHDOT_SHEETS_1**" is selected in the ***Properties*** dialog. The parameters for the item type are edited in the ***Properties*** dialog.



In the OHDOT sheet borders, the Item Type definition is always attached to the sheet cut line shape element. This shape element is always the first element in the cell, as shown above. Changes made to the **Items** in the ***Properties*** dialog are immediately reflected in the design.

An example of the item types in the title block is shown at right.



IMPORTANT! **Item Types should never be edited as text elements. Always edit the item types using the properties dialog as shown above.**

The Design Agency Cell

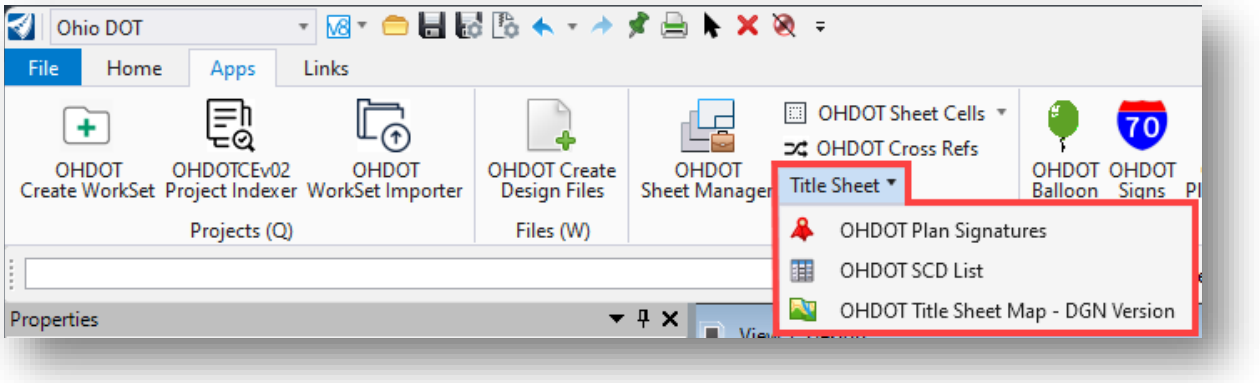
The Design Agency portion of the sheet is intended for the company logo.

For ODOT users, the cell **ODOT_ZEPHYR** contained in the OHDOT_Sheets cell library is used. This cell is automatically placed with the sheet border when using the OHDOT Sheet Cells application. For sheets generated using OpenRoads tools, the agency cell must be manually placed in the sheet border.

Plans prepared by consultants should use their company logo and never the ODOT logo. The configuration variable DESIGN_AGENCY_CELLNAME may be defined to specify the name of the cell to be used for the company logo. See the OHDOT Sheet Cells documentation for more information.

9 Title Sheet Applications

The OHDOT WorkFlow includes three applications specific to the title sheet as shown below. Each application is briefly described below. See the online help for each application for more information.

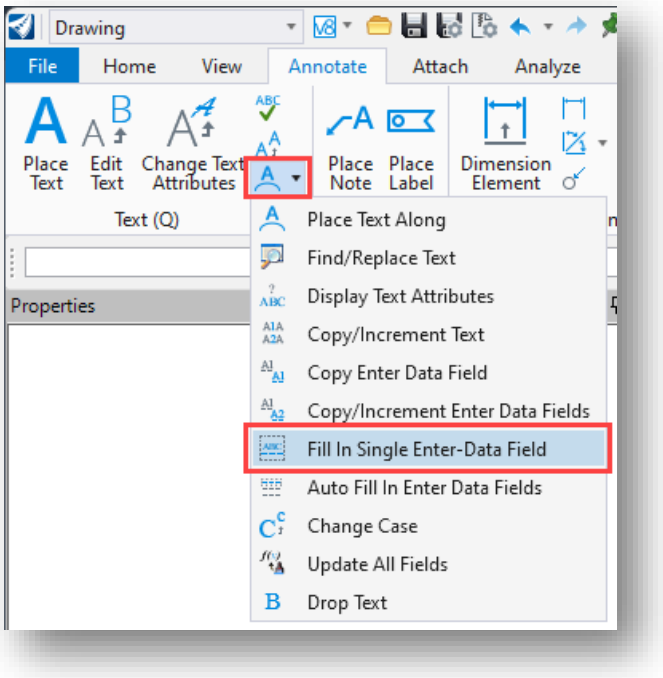


SCD List

The title sheet cell includes data entry fields to enter the Standard Construction Drawing, Supplemental Specifications, and Special Provisions data as shown below.

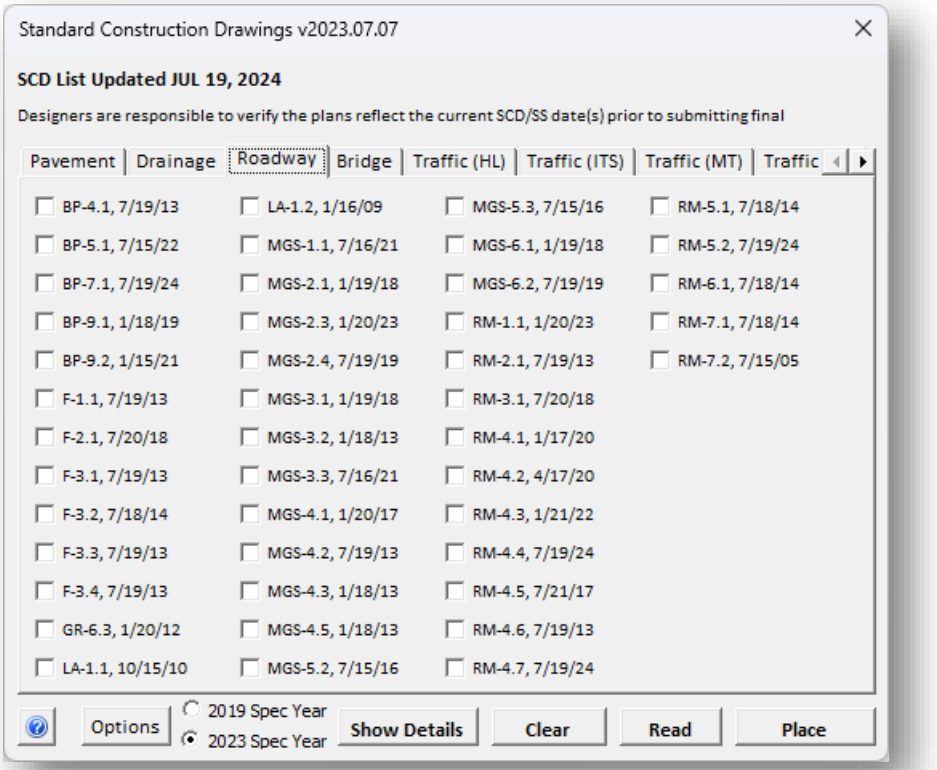
STANDARD CONSTRUCTION DRAWINGS					*SUPPLEMENTAL SPECIFICATIONS*	*SPECIAL PROVISIONS*

Data can be manually entered into data entry fields by use of the **Fill in Single Enter-Data Field** or the **Auto Fill In Enter Data Fields** commands as shown below.

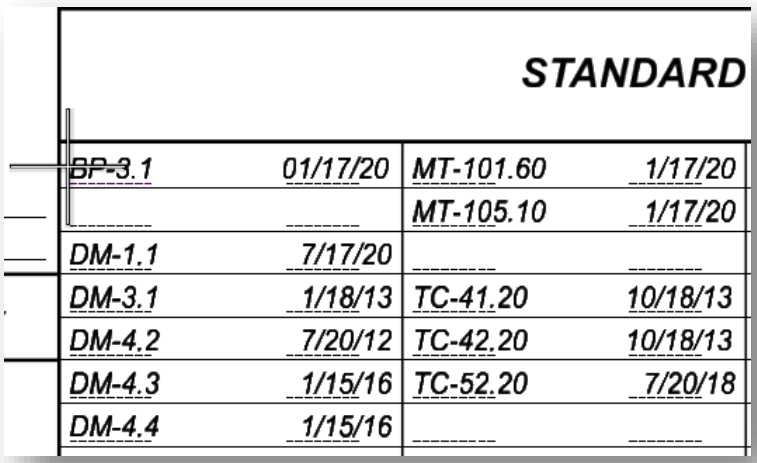


The **OHDOT SCD List** application is used to place the Standard Construction Drawing, Supplemental Specifications data as text elements on top of the data entry fields.

The application provides a pick list of the available Standard Construction Drawings and Supplemental Specifications as shown on the following page.



After selecting the desired drawing and specifications, the data is placed in the design by snapping to the origin up the upper left data entry field as shown below.



STANDARD			
BP-3.1	01/17/20	MT-101.60	1/17/20
		MT-105.10	1/17/20
DM-1.1	7/17/20		
DM-3.1	1/18/13	TC-41.20	10/18/13
DM-4.2	7/20/12	TC-42.20	10/18/13
DM-4.3	1/15/16	TC-52.20	7/20/18
DM-4.4	1/15/16		

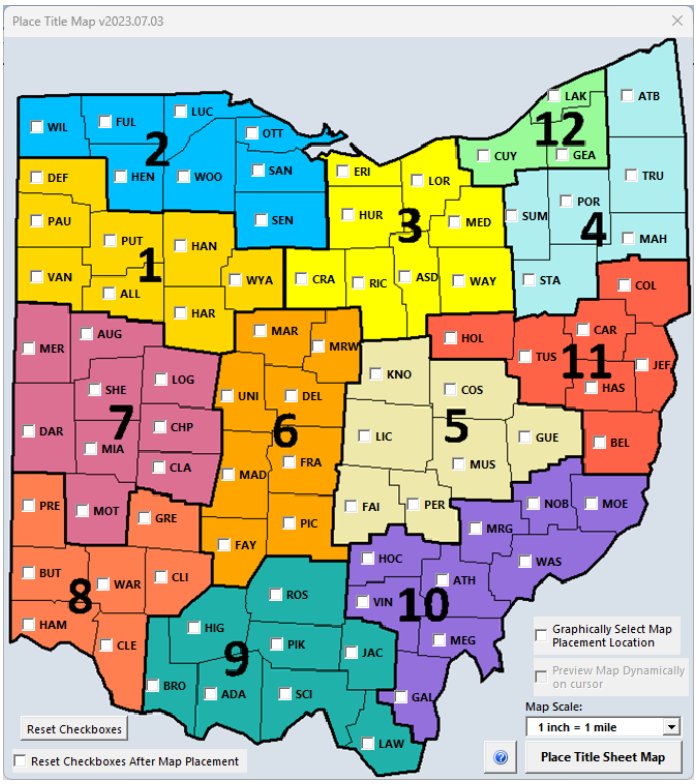
See the help document for more information on the operation of this application.

Title Sheet Map

ODOT offers a Title sheet map application which is available within the Ohio DOT workflow menu. The application uses a DGN based map to generate the project map for the title sheet.

Title Sheet Map - DGN Version

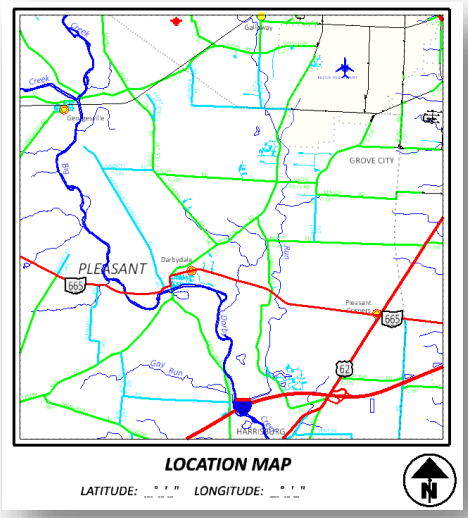
A new version of the title sheet map application is available with the OHDOT CADD Standards published in November 2021. This version uses an updated version of the Ohio County Maps design files.



When the application is loaded, the dialog shown at left is opened.

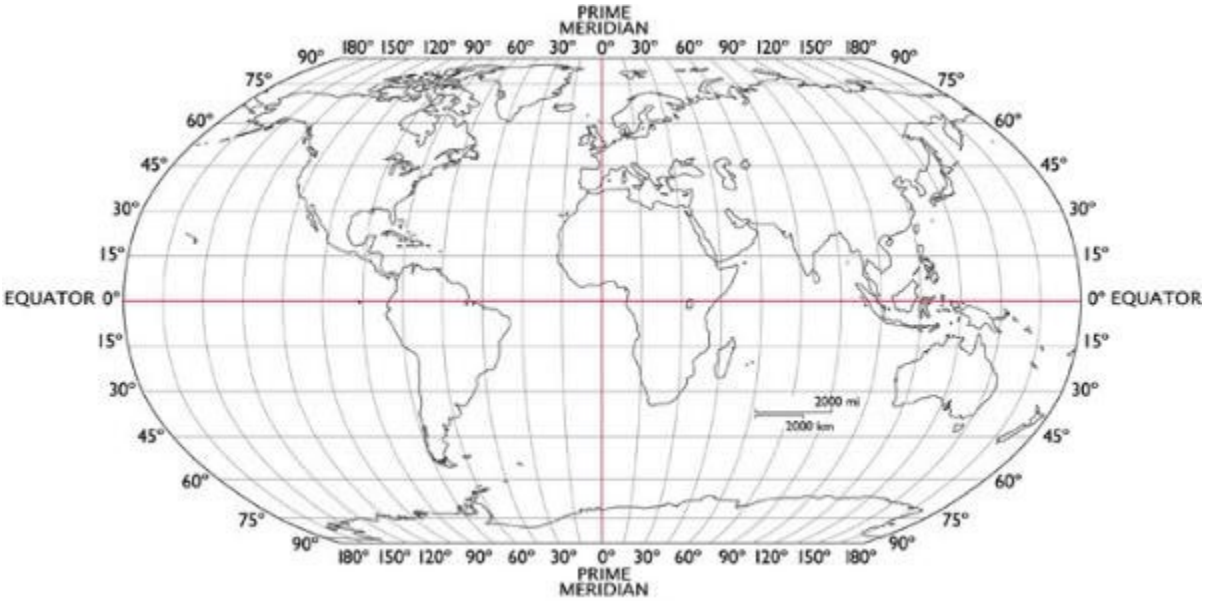
Select the desired county(s) from the Ohio Map. Choose the **Place Title Sheet Map** button to initiate the process. The selected county(s) are attached as a reference with a bounding box dragging on the cursor to select the map area. Once selected, the map is copied to the title sheet.

An example of the map is shown below.



Latitude, Longitude Coordinates

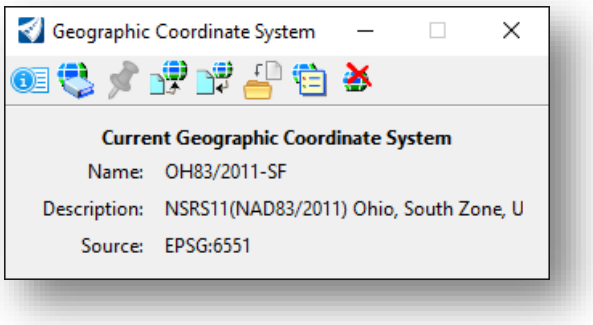
Latitude and longitude coordinates are shown on the title sheet according to the **Location and Design Manual – Volume 3, Section 1302.8**.



Latitude (northing) and longitude (easting) coordinates can be displayed in OpenRoads if a Geographic Coordinate System (GCS) has been defined in the file by taking the steps below:

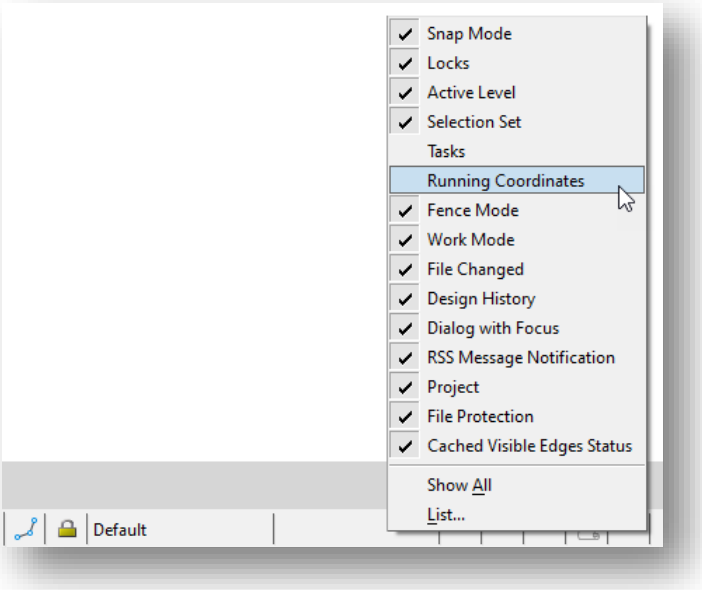
- ✓ Open a design file with a GCS defined. The Geometry Basemap (BK) design file is a good file to use for this purpose since the alignment in formation is drawn in this file.

- ✓ Verify that a GCS has been assigned by selecting **Utilities > Coordinate System** from the **Drawing** WorkFlow. A GCS should be defined like the example below. If no GCS is defined, contact the District Survey Operations Manager.



The **Running Coordinates** display is used with an Auxiliary Coordinate System (ACS) to display the latitude and longitude coordinates.

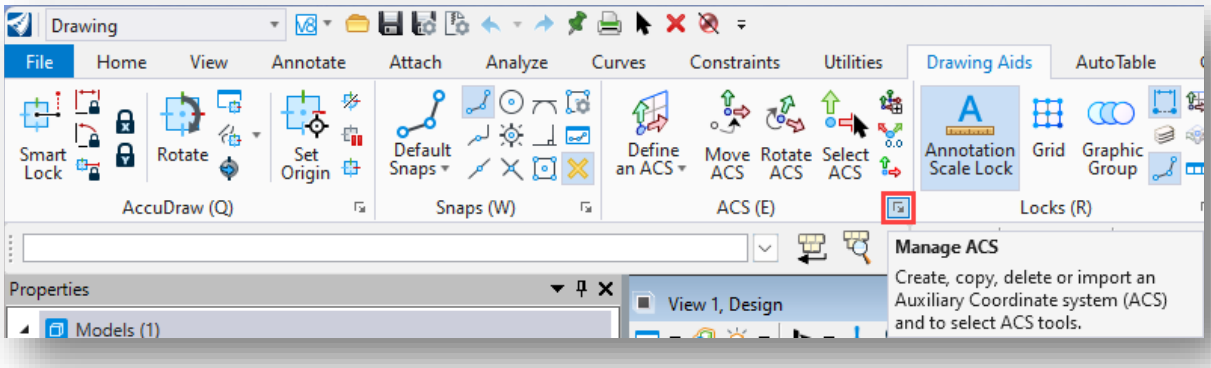
✓ Turn on the running coordinates display by right-clicking in the bottom-right portion of the OpenRoads window as shown below.



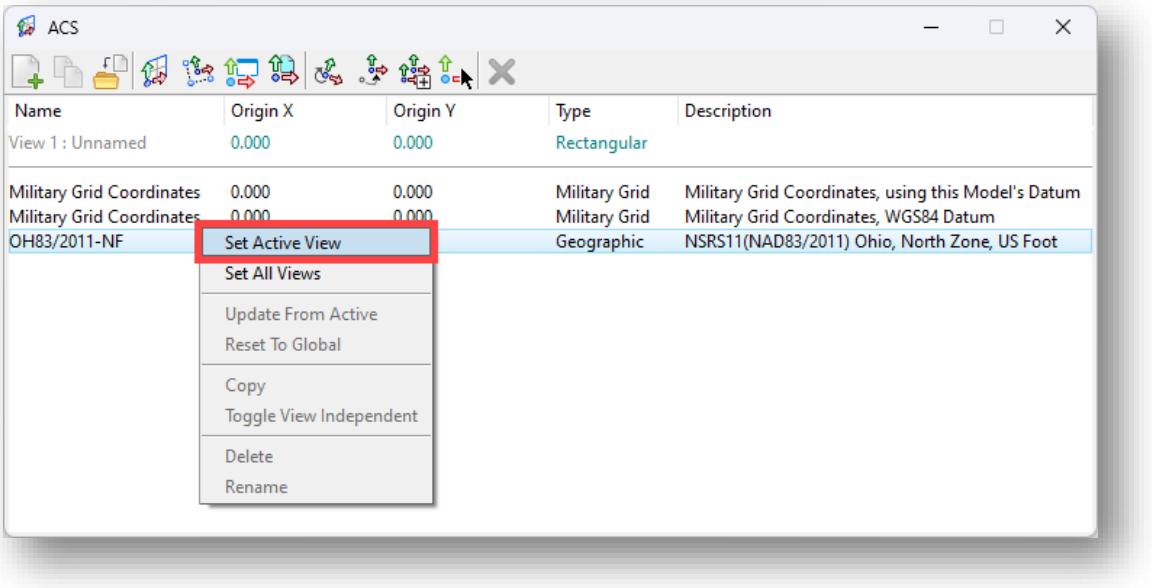
The coordinates of the cursor position are dynamically displayed as the cursor is moved in the ORD view window.

To display latitude and longitude coordinates, an ACS using the current GCS must be defined.

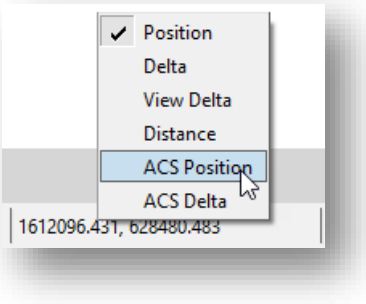
✓ Select the **Manage ACS** icon as shown below.



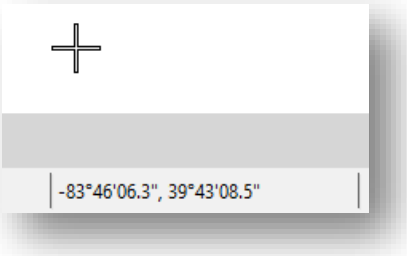
✓ The ***ACS*** dialog is opened as shown below. Right-click the GCS that is defined for the file and choose the **Set Active View** option. Close the dialog.



✓ Left click the running coordinates display and choose the ACS Position option as shown below.



As the cursor is moved in the view window, the ACS coordinates are displayed in Longitude (Easting), Latitude (Northing) format as shown below.



Move the cursor to the approximate center of the project to get the latitude and longitude coordinate values that are to be shown on the title sheet.

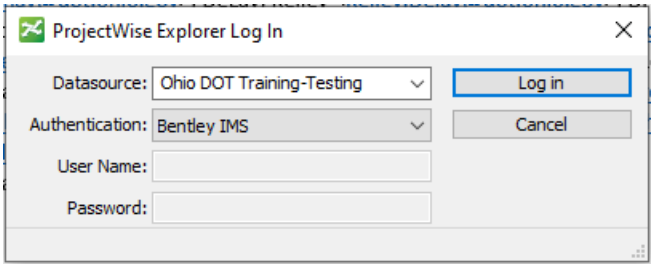
Exercise: Title Sheet Applications

This exercise will use the tools documented in this section to create the title sheet for the sample project.

Part 1: Title Sheet Border Cell

The title sheet design file was created in the previous chapter. The file is created in the following location:

- Open ProjectWise Explorer if it is not currently open.
- When prompted, sign into ProjectWise as shown below.



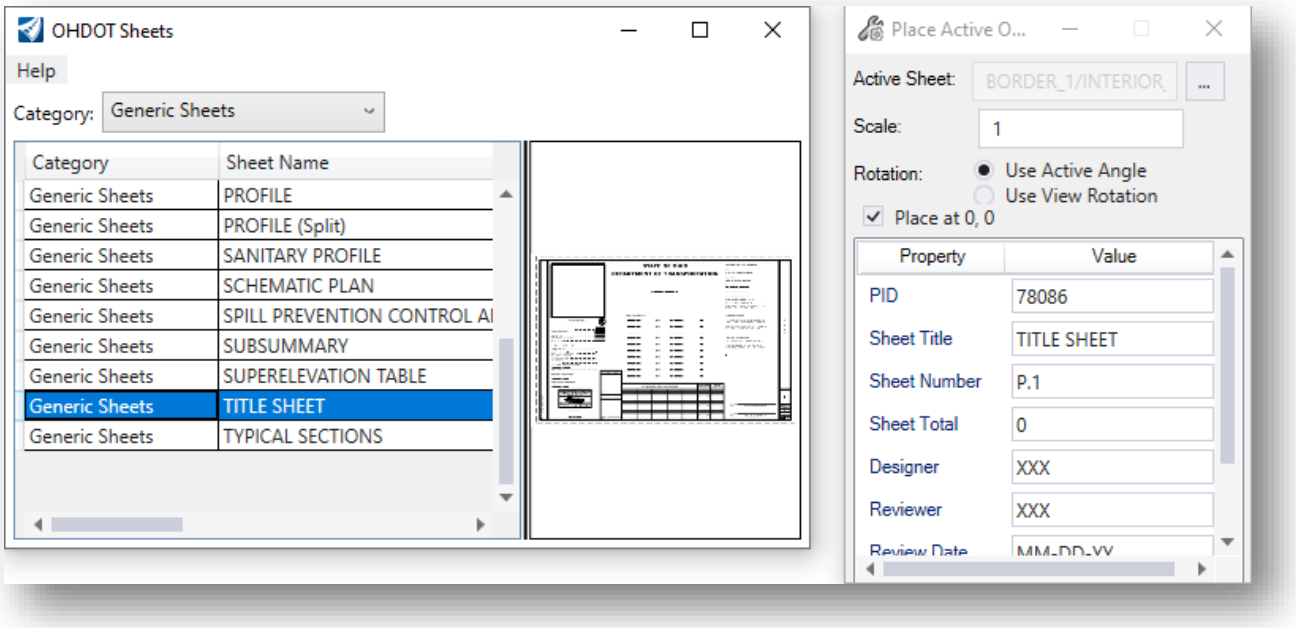
- Browse to the sample project to open the title sheet design file listed below.

  ..\ IntroToMicroStationTraining\78086\400-Engineering\Sheets\78086_GT001.dgn

✓ Use the **OHDOT Place Sheet Cells** application (**Ohio DOT > Apps > OHDOT Sheet Cells**) to place the title sheet border. The sheet can be placed at the 0,0 coordinate by toggling the **Place at 0,0** option on, or by snapping to the sheet boundary in the sheet model.

✓ When placing the border, enter the following information for the Item Type values:

Property	Value
PID	78086
Sheet Title	TITLE SHEET
Sheet Number	P.1
Sheet Total	55
Designer	Your Initials
Reviewer	The Reviewers Initials
Review Date	Today's Date
CRS	GRE-72-13.67



Part 2: Title Sheet SCD List

Use the OHDOT SCD List application (**Ohio DOT > Apps > Title Sheet > OHDOT SCD List**) to place various standard construction drawing and supplemental spec data on the title sheet.

Part 3: Latitude and Longitude Coordinates

Using this chapter as a guide, get the latitude and longitude coordinates for the sample project.

- ✓ Open the Alignment design (**400-Engineerng\Roadway\Basemaps\78086_BK001.dgn**) file to record the latitude and longitude values for the title sheet.

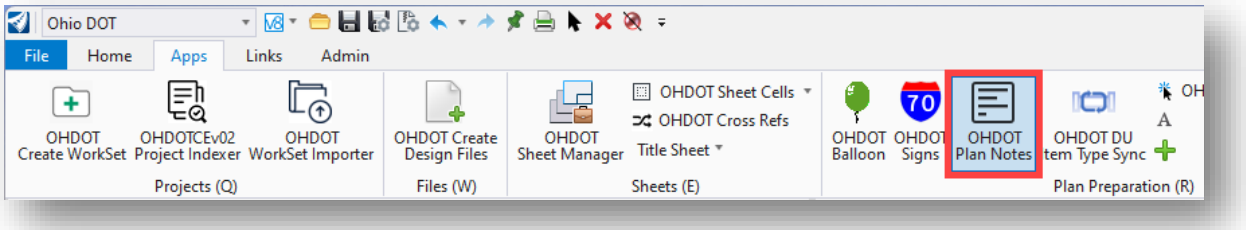
- ✓ Open the Title Sheet design file (**400-Engineerng\Roadway\Sheets\78086_GT001.dgn**) and edit the Latitude and Longitude values.

  The text in the cell can be edited by use of the **Edit Text** command without the need to drop the interior cell into separate components.

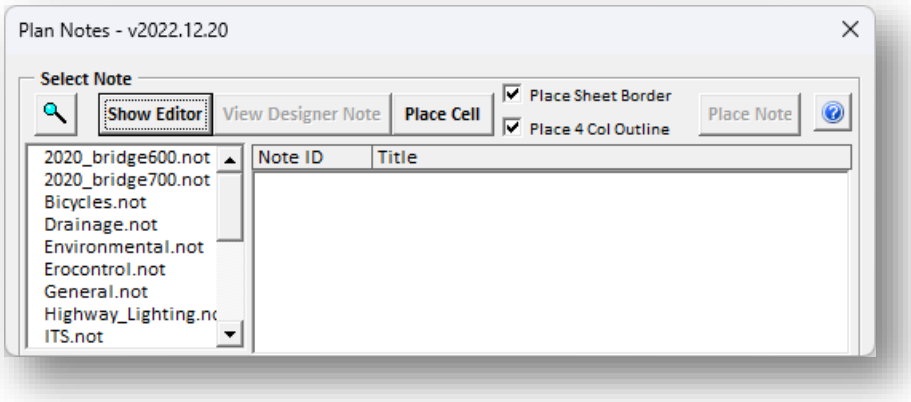
After completing the exercise, close the design file and check the file back in to ProjectWise.

10 General Notes Sheets

ODOT provides a custom application to assist the user with the task of generating the General Notes sheets. The application can be found in the Ohio DOT WorkFlow in the Plan Preparation section as shown below.



The dialog shown below is opened.

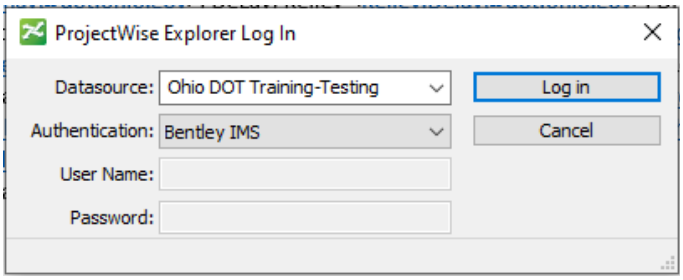


The available note files, selected from the left side of the dialog, are read from the ODOT Website. The dialog operation is explained by selecting the Help icon in the upper right.

Exercise: General Notes Sheets

The general notes sheet design file was created in a previous chapter. Take the following steps to add the sheet border cell and place general notes in the file.

- Open **ProjectWise Explorer** if it is not currently open.
- When prompted, sign into ProjectWise as shown below.

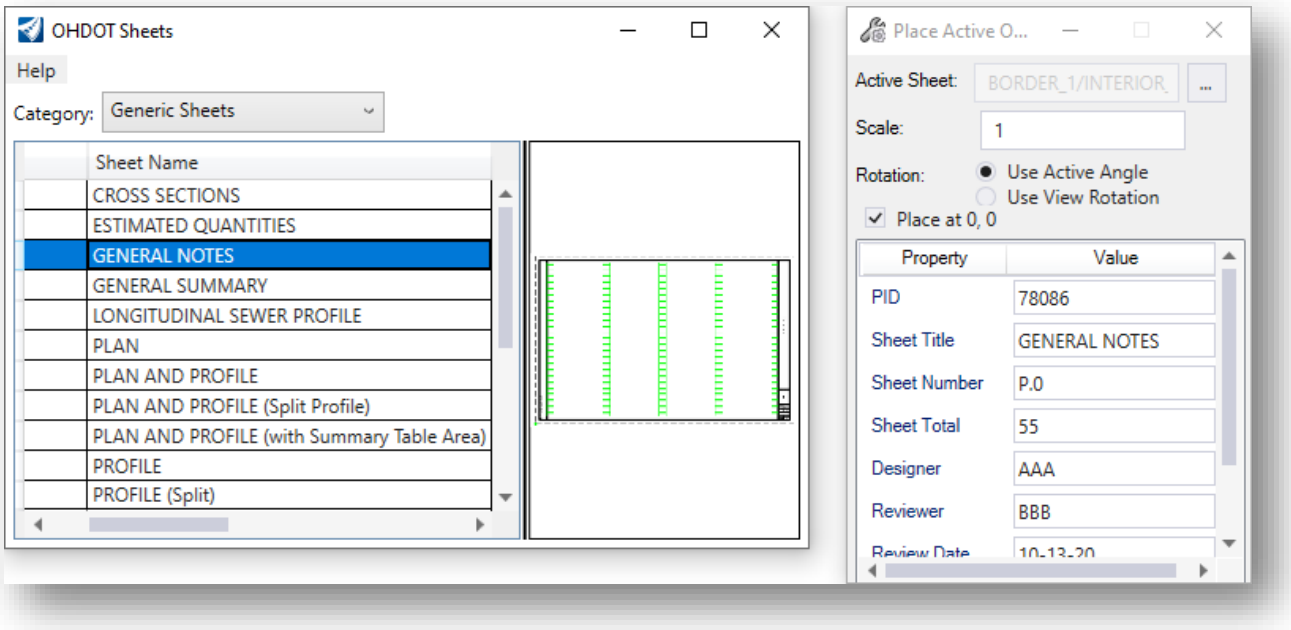


- Browse to the sample project to open the file listed below.

  Ohio DOT Projects\Documents\06 Training Projects*Class DateUser Name*\ IntroToMicroStationTraining\78086\400-Engineering\Sheets\78086_GN001.dgn**

✓ Use the **OHDOT Place Sheet Cells** application to place the general notes sheet border.

✓ The sheet can be placed at the 0,0 coordinate by toggling the **Place at 0,0** option on, or by snapping to the sheet boundary in the sheet model.



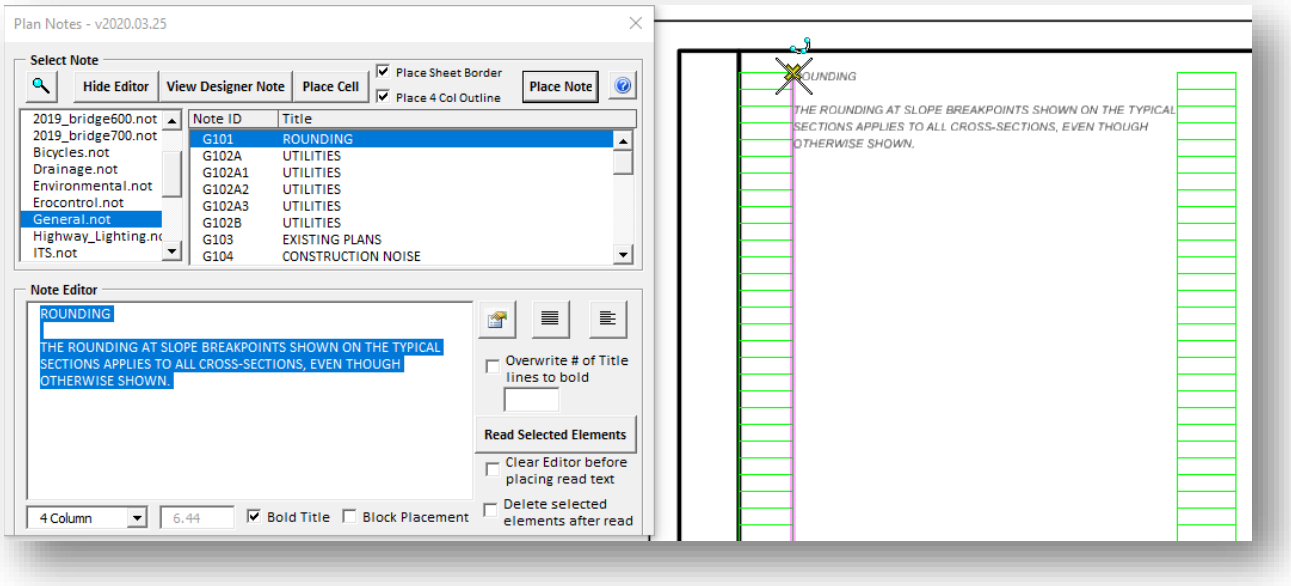
  - When placing the border, enter the following information for the Item Types:

Property	Value
PID	78086
Sheet Title	GENERAL NOTES
Sheet Number	P.0
Sheet Total	55
Designer	Your Initials
Reviewer	The Reviewers Initials
Review Date	Today's Date
CRS	GRE-72-13.67

The sheet border is placed in the file along with a 4-column outline that is used as a guide for placing notes.

- ✓ After placing the sheet border in the file, use the **OHDOT Plan Notes** application (**Ohio DOT > Apps > Plan Preparation > OHDOT Plan Notes**) to place the general notes for the project.

  Note: The Plan Notes application can also place the sheet border and 4 columns. When the **Show Editor** button was selected the user will get the note editor options shown below. Select the **magnifying glass** icon for more information.



- ✓ Use the application to place the following notes in the design file. When placing the notes, snap to the green guidelines to place each note like the example above.

Note File	Note ID
General.not	G101 ROUNDING
General.not	G102A UTILITIES – Note the utility information can be edited in the Plan Notes dialog before placing the note.
General.not	G106 WORK LIMITS
Drainage.not	D107 FARM DRAINS

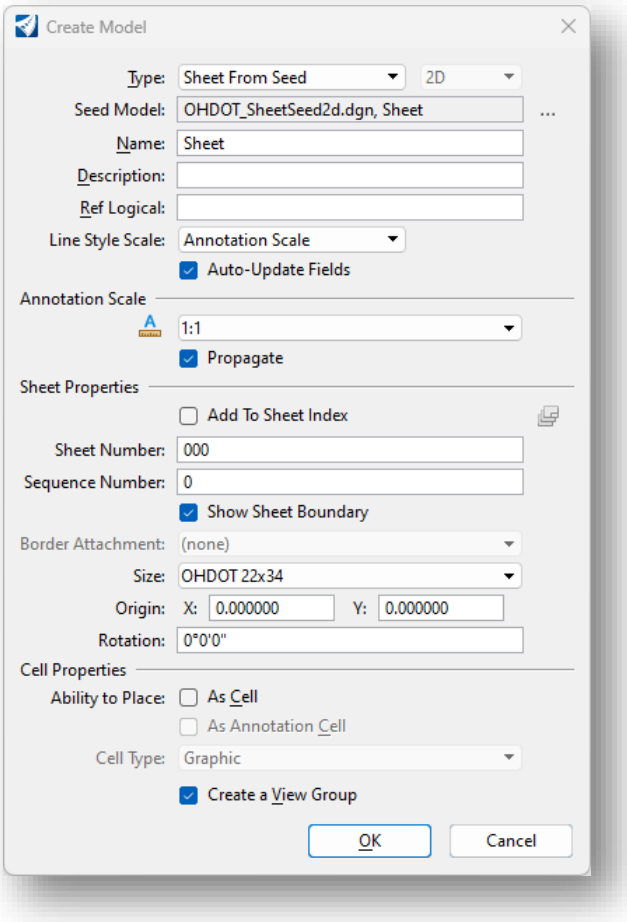
- ✓ Continue placing additional notes as desired.

Common Question: What if I need more than one note sheet?

- OHDOT CADD Standards specify only one sheet per model.
- Additional models can be created in the DGN file for additional sheets.

Take the following steps to create an additional sheet model for the notes:

- ✓ Open the **Models** dialog (**Drawing > Home > {Primary > Models**)
- ✓ Select the **Create New Model** icon. The **Create Model** dialog, shown at right, is opened.
- ✓ Using the settings at right, be sure set the **Type** to **Sheet** and to enter in a unique **Name** for the new model to be created.
- ✓ Select **OK** to create the new model.
- ✓ After creating the new model, place the General Notes cell and add some notes to the sheet.



This completes this exercise.

- ✓ Exit ORD and check the file back in to ProjectWise.

11 General Summary

The General Summary is a table that lists all the pay items (items of work) and their quantities for a project. It also breaks down the quantities to what sheets they come from as well as what funding split. Pay items are referred to as item codes.

https://www.dot.state.oh.us/Divisions/ConstructionMgt/OnlineDocs/Pages/2023-Online-Spec-Book.aspx
The standardized list of currently available item codes can be found in the item master. The item master is typically updated daily, and the latest item master can be downloaded from the below link in either an excel or pdf format.

Item Master | Ohio Department of Transportation
A given item code is formatted with three parts, the Item Number, Units of measurement (English or Metric), and item extension. The format is explained below.

[IN][U][IE]

Item Number [IN]= three-digit number that corresponds with a section in the C&MS.
Units of measurement [U] = E for English or M for metric (currently only English units are used)
Item Extension [IE] = five-digit number.

Example Item code: 441E10100
Item Number = 441
Units of measurement = E for English
Item Extension = 10100
The item master specifies the units, description, and special instructions (if any) for this given item as.
Unit: CY (cubic yards)
Description: ASPHALT CONCRETE SURFACE COURSE, TYPE 1, (446), PG70-22M
Special Instruction: None

The C&MS is updated every 3 years. A project is sold under a specific update of the C&MS. This is commonly referred to as the spec year. Currently the spec year is 2023. This means there is a 2023 C&MS and a 2023 item master.

To help streamline the creation of a General Summary table and reduce user errors, a template excel file has been created. The file can be found within the OHDOT workspace at the following location.

\..\OHDOT\Standards\OHDOT Utilities\GenSum\CTY-PID-GENSUM.xlsm
Exact location varies depending on given site configuration
OhioDOT ProjectWise DataSource Location: pw:\\ohiodot-pw.bentley.com:ohiodot-pw-02\Documents\03 Standards\CADD Standards\CONNECT_Config\WorkSpaces\OHDOTCEv02\Standards\OHDOT Utilities\GenSum\

This excel file should be copied into your workset in the
\..\[PID]\400-Enginering\Roadway\EngData

folder or equivalent location.

This General Summary Excel file is required to be filed with your project.

For in-depth details of how to fill out the general summary excel file please see this YouTube playlist

https://www.youtube.com/watch?v=kLaZYdUbTHQ&list=PLdyShNRgZlb4S1QpyT0V9mxBs82Qz11KU

The General Summary excel file has also been set up to generate the general summary table but extracting all the pay code and quantity data from sub-summaries. For in-depth details of how to use this automated GenSum feature see this YouTube playlist.

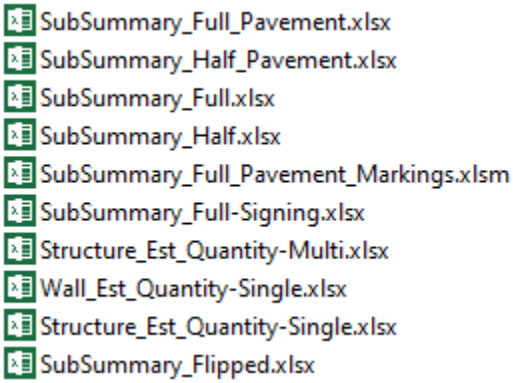
https://www.youtube.com/watch?v=UlsFW9ivtCk&list=PLdyShNRgZlb4qz8vNV5GaYyLMv3sJHmGO

Standard Summary Excel Files

In addition to the template general summary excel file, there are also several excel template files for sub-summaries sheets. They can be found within the OHDOT workspace at the following location,

\..\OHDOT\Standards\OHDOT Utilities\GenSum\Standard_Excel_Summaries

Exact location varies depending on given site configuration
OhioDOT ProjectWise DataSource Location: pw:\\ohiodot-pw.bentley.com:ohiodot-pw-02\Documents\03 Standards\CADD Standards\CONNECT_Config\WorkSpaces\OHDOTCEv02\Standards\OHDOT



Utilities\GenSum\Standard_Excel_Summaries\

These summary sheets are also set up for the automated GenSum feature mentioned above. The formulas within these excel files will display a given item code's description by linking to a copy of the item master contained within the item master add-in. To ensure these links are valid and not broken the Fix Links button in the Item Master Add-in should be used. See the following section for my details.

Item Master Excel Add-in

The Item master Excel add-in is an Excel add-in that you can install. Once installed it will add an ODOT tab within Excel Ribbon as imaged below.

This add-in loads any time excel is open (you don't need to open the gensum or a specific summary excel file). This allows for easy and quick access to the item master. It also provides a way for summary sheets to pull data about item codes (like description) and display them via formulas. This removes the need to type out item descriptions.

The important thing to remember is that each summary excel file is specifically linked to the item master add-in. This link can break (especially if the excel files are being passed around). To ensure the links are valid the add-in contains a fix links button which will handle fixing any broken links.

For more information see this YouTube video

https://www.youtube.com/watch?v=3nLDWu3IhJg&list=PLdyShNRgZlb4qz8vNV5GaYyLMv3sJHmGO&index=2

12 Summary Tables with AutoTable

After the excel tables are created AutoTable can be used to convert that excel sheet into MicroStation graphics. We have set up AutoTable to follow our OHDOT CADD standards. The standard row height at 1:1 scale should be .28. All the excel files mentioned in the pervious section are set up to achieve this standard.

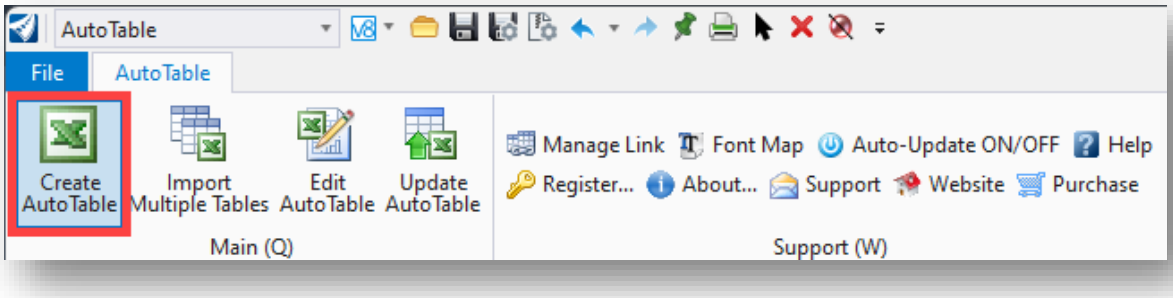
For AutoTable to scale things correctly the user MUST run a batch file to set the Auto-Table settings correctly. This batch file can be found within the OHDOTCEv02 workspace at the following location,

\..\OHDOTCEv02\Standards\Cadig\AutoTableStandards\AutoTableSetup_CONNECT.bat
Exact location varies depending on given site configuration

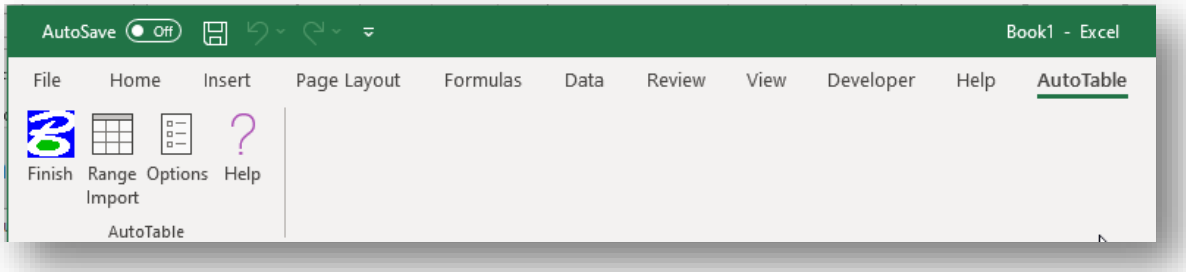
OhioDOT ProjectWise DataSource Location:
pw:\\ohiodot-pw.bentley.com:ohiodot-pw-02\Documents\03 Standards\CADD Standards\CONNECT_Config\WorkSpaces\OHDOTCEv02\Standards\Cadig\AutoTableStandards\
Unfortunately, batch files cannot be run from within ProjectWise. If the Workspace is within ProjectWise, then export the file and run it locally.

These Auto-Table settings are specific to the logged in user on that given computer. So, if another user logs into the same machine they will also have to run this batch file.

To create an autotable, you must start from OpenRoads Designer and select the Create AutoTable button.



This will launch excel with the AutoTable tab.



Now from this instance of excel (the instance with the AutoTable Tab) you can open other excel files, for example a gensum or one of the other standard excel summary files.

The most common use would be to select the range of cell you want to bring into MicroStation and select the Range Import button.

After selecting the Range Import button, the table will be created in MicroStation and floating on your cursor where you can data point to place the table. This table is a static link to the excel file. The Update AutoTable button can be used to update the MicroStation graphics with any changes made to the excel file. The Edit AutoTable button can be used to open the excel file for edit.

Note that the AutoTable will place unrotated at a 1:1 scale. If any rotation or scaling is needed, then that can be done after its placed using the MicroStation Modify tools like Rotate and move.

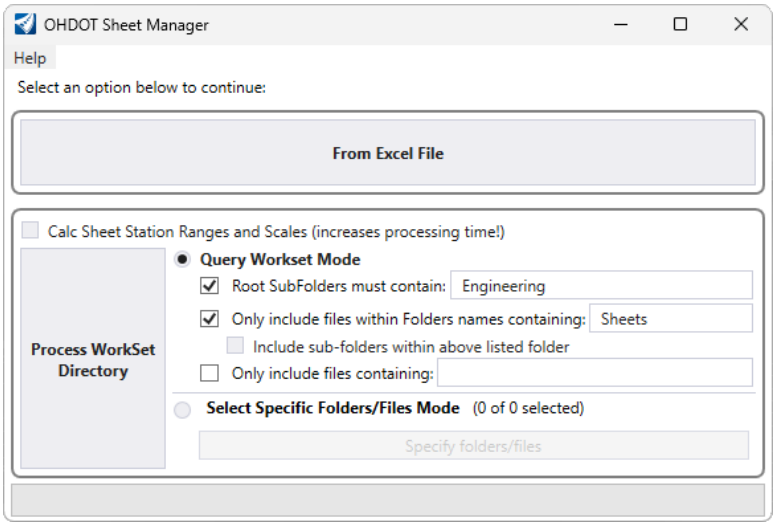
There are also some excel template files that are sized correctly to fit within the sheet border cell. These excel templates do not have any advanced formatted like that summary excel files mentioned in the previous section. There is no link to the item master in these files. Typically, these excel templates are for tables that don't contain item codes. They can be found within the OHDOT workspace at the following location,

\..\OHDOTCEv02\Standards\Cadig\Templates
Exact location varies depending on given site configuration

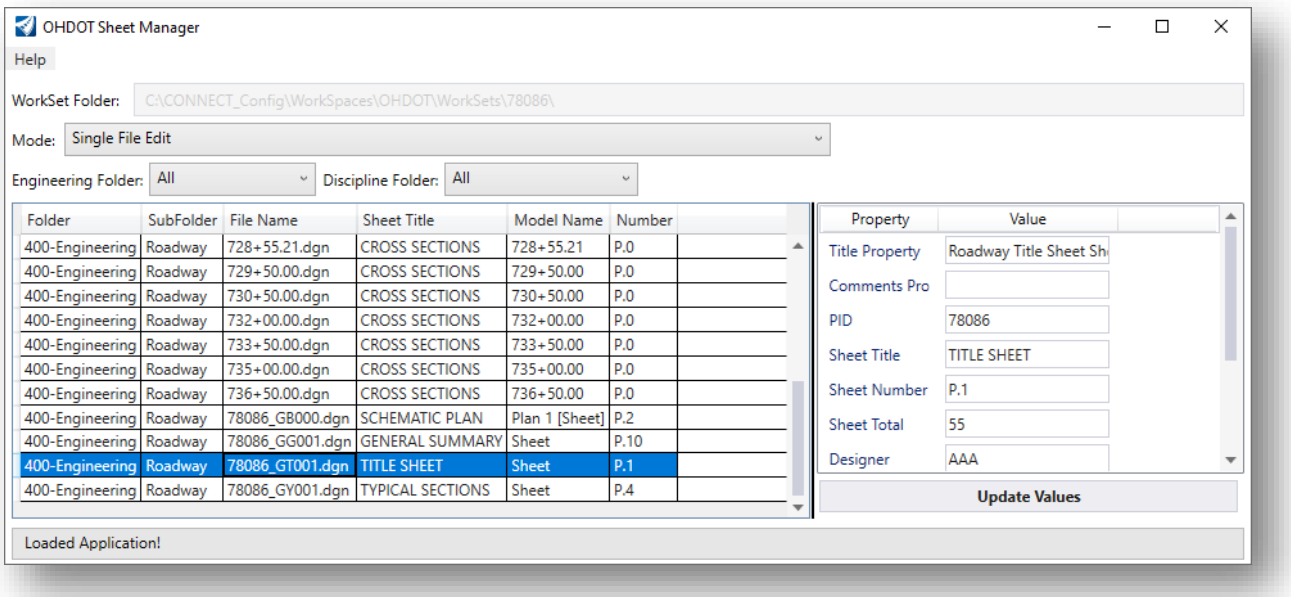
OhioDOT ProjectWise DataSource Location:
pw:\\ohiodot-pw.bentley.com:ohiodot-pw-02\Documents\03 Standards\CADD Standards\CONNECT_Config\WorkSpaces\OHDOTCEv02\Standards\Cadig\Templates\

13 OHDOT Sheet Manager

The Sheet Manager is used to manage the sheet title block data (Item Types) for all the sheets within the WorkSet.



The application is accessed by selecting **Ohio DOT > OHDOT Sheet Manager** from the OpenRoads ribbon. In the example below, a sheet design file has been selected with the sheet attributes displayed to the right.



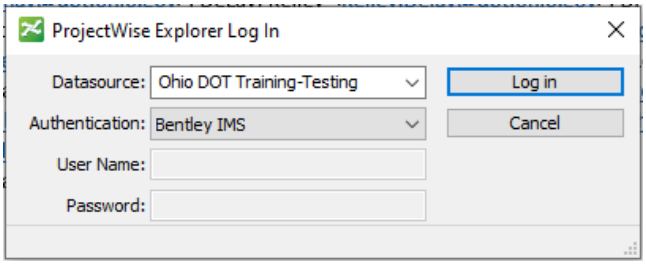
This application is used to review and edit the value of the MicroStation item type elements in the sheet title block for a selected design file. Select the **Help** icon for complete documentation.

Exercise: OHDOT Sheet Manager

In this exercise, we'll look at the various modes of operation for the **OHDOT Sheet Manager** application.

Part 1: Single File Edit

- Open ProjectWise Explorer if it is not currently open.
- When prompted, sign into ProjectWise as shown below.



- Browse to the sample project to open the title sheet design file listed below.

  ..\IntroToMicroStationTraining\78086\400-Engineering\Roadway\Sheets\78086_GT001.dgn

✓ Open the Sheet Manager application by selecting **Ohio DOT > Apps > OHDOT Sheet Manager** from the OpenRoads ribbon.

✓ Select the **Single File Edit** option.

The sheets can be sorted using the **Engineering Folder** and the **Discipline Folder** lists.

✓ Select the **Schematic Plan *(GB)*** from the file list. The parameters for the sheet border are listed in the dialog.

Define the following values for the Schematic Plan sheet:

- PID: 78086
- Sheet Title: SCHEMATIC PLAN
- Sheet Number: P.2
- Sheet Total: 55
- Designer: Enter your initials
- Reviewer: Enter initials for the reviewer
- Review Date: Enter today's date in MM-DD-YY format
- Scale2: 50
- Scale3: 100
- Scale4: 200
- CRS: GRE-72-13.67

Select the **Update Values** button to apply the values. The Sheet Cell in the file is updated with the new values.

- ✓ After updating the values, open the Schematic Plan design file to verify that the items type data for the sheet was updated.

- ✓ You do not need to be in the file to edit the parameters. Select another file from the list, the General Notes file for example. Assign the parameters for the sheet and use the **Update Values** button to write the values to the file.

Part 2: Export to Excel

The **Export to Excel** mode is used to read the Sheet attributes and write the values to an Excel file. The Excel file can be edited and saved, and then re-read to update the sheet files to match the parameters as defined in the Excel file.

- ✓ Open the Sheet Manager application by selecting **Ohio DOT > Apps > OHDOT Sheet Manager** from the OpenRoads ribbon.

- ✓ Select the **Export to Excel** option.

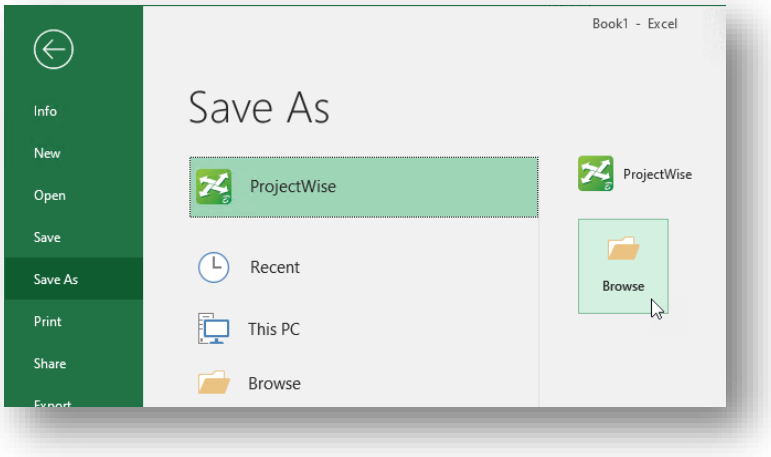
- ✓ Choose the **Export Displayed Data to Excel** option. Excel is opened with the exported data.

- ✓ Edit the fields in Excel to enter the following values for the files:

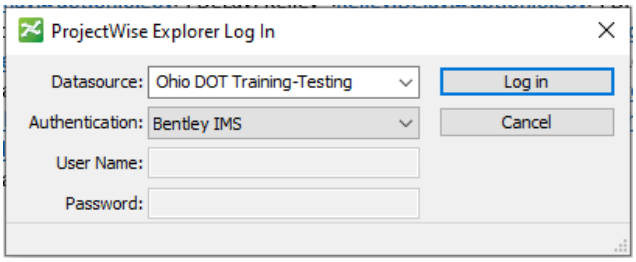
PID:	78086
Sheet Total:	55
Designer:	Enter your initials
Reviewer:	Enter initials for the reviewer
Review Date:	Enter todays date in MM-DD-YY format
CRS:	GRE-72-13.67

- ✓ Update the page numbers for the plan and profile sheet design files to pages P.14 to P.18

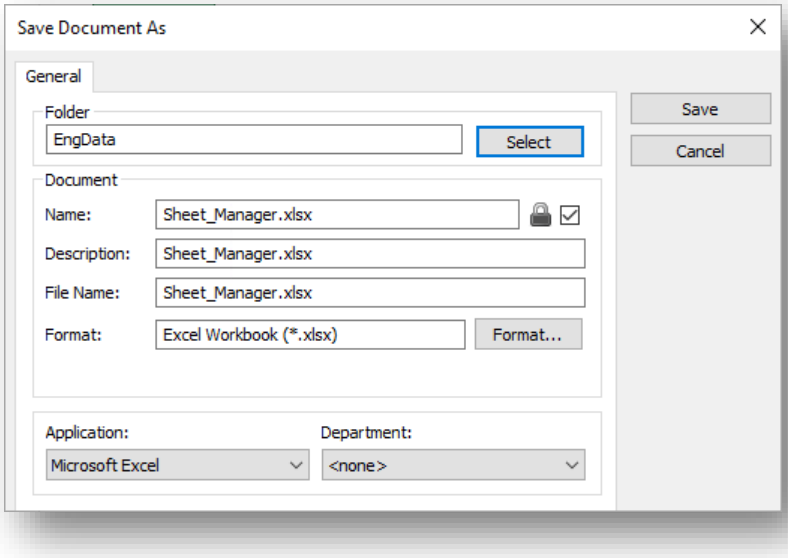
- ✓ After making the edits, choose **File > Save As** from the Excel menu.
  - Choose **ProjectWise > Browse**



  - You are prompted to enter your ProjectWise credentials. Select the **Training-Testing** Datasource and the **Bentley IMS** Authentication as shown below.



- When prompted, select the **No Wizard** option for the document creation wizard.
- Save the document to the **400-Engineering\Roadway\EngData** folder for the training data. Name the file as shown below.



✓ When prompted, check the file into ProjectWise by selecting the **Check In** option.

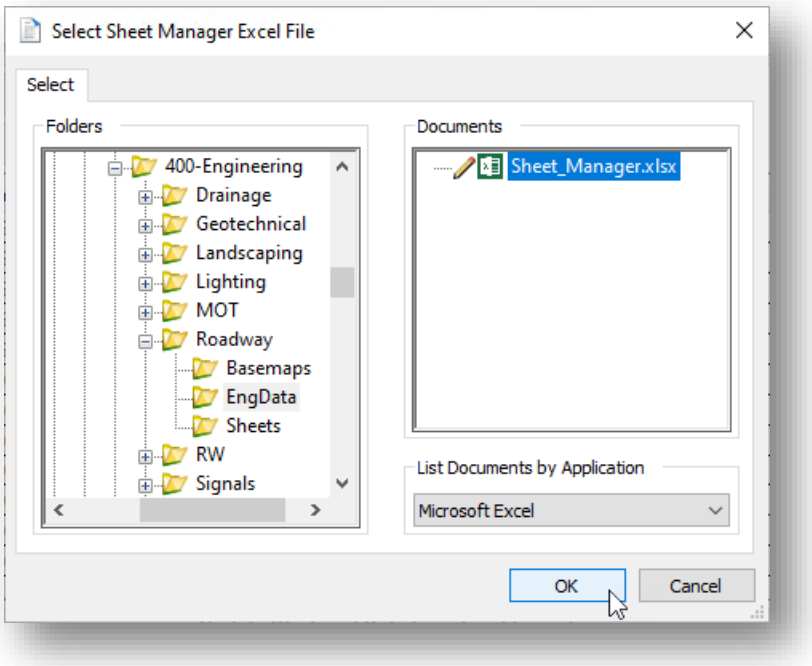
Part 3: Import from Excel

The **Import from Excel** mode is used to read the contents of an Excel file generated by the **Export to Excel** mode to update the sheets using the values for the title block items as defined within the Excel file.

✓ Open the Sheet Manager application by selecting **Ohio DOT > OHDOT Sheet Manager** from the OpenRoads ribbon.

✓ Select the **Import from Excel** option.

✓ Choose the **Update Displayed Data from Excel Import** option. Select the Excel file from the dialog like the example below.



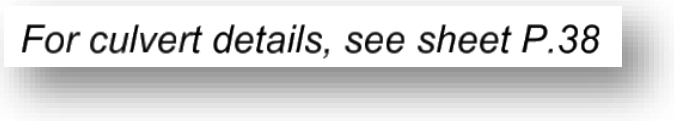
As the data is processed, each design file is opened, updated, and then checked back into ProjectWise.

When complete, the results can be reviewed by selecting the **Results** button at the bottom of the OHDOT Sheet Manager dialog.

- ✓ Toggle the **Sheet Manager** to the **Single File Edit** mode. Select a few of the files at random to verify that the item type information has been updated.
- ✓ After reviewing a few of the sheet design files, close the Sheet Manager application.
- ✓ This completes this exercise. Close the design file and check it back in to ProjectWise.

14 Sheet Cross-References

The OHDOT Sheet Cross References application is used to create updatable fields for sheet call outs, like the example below:

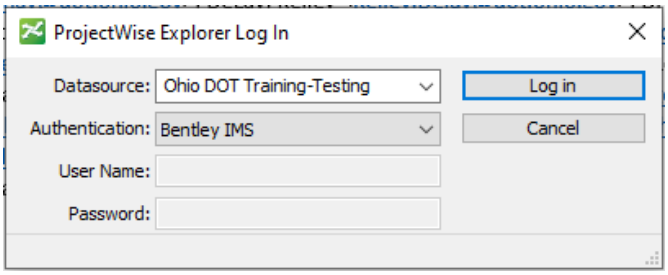


Notes:

- The cross reference is added as a MicroStation Field to the end of a user selected text string that has been previously placed in the DGN file.
- The cross reference is generated by reading the Sheet Item Types from a selected DGN file.
- The text string can be edited after the cross reference has been generated if the field is not deleted.

Exercise: Assigning a Cross-Reference

- Open ProjectWise Explorer if it is not currently open.
- When prompted, sign into ProjectWise as shown below.



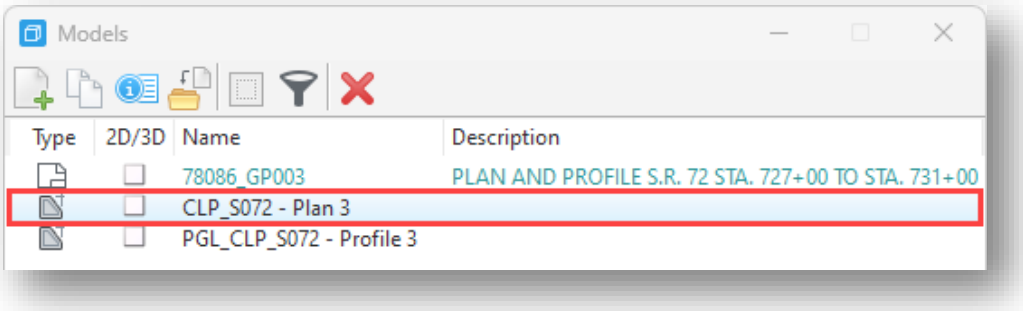
- Browse to the sample project to open the design file listed below.

  Ohio DOT Training-Testing\Documents\06 Training Projects *User Name*\ IntroToMicroStationTraining\78086\400-Engineering\Roadway\Sheets\78086_GP003.dgn

  This file was generated using OpenRoads Designer to create the plan and profile sheets. The file contains two drawing models, one for the plan and one for the profile, as well as a sheet model containing the completed sheet. Annotations, such as the cross-reference text, are placed in the plan view drawing model, not in the sheet model.

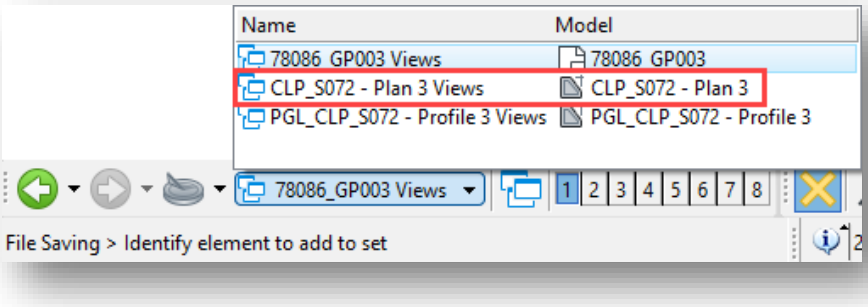
- After opening the design file, change the active model to the plan view drawing model.

The models in the file can be reviewed and activated by choosing **Drawing > Home > Primary > Models**.

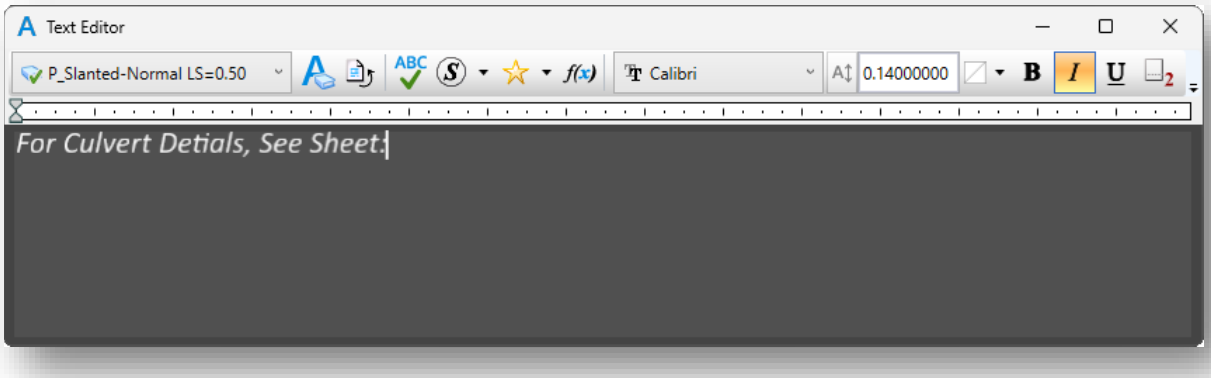


- Activate the plan view drawing model by double-clicking the model's name (CLP_S072 – Plan 3) in the **Models** dialog.

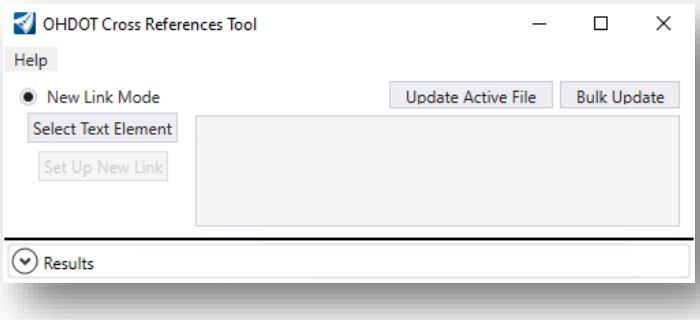
  The model can also be selected from the View Groups dialog, which is docked in the lower left of the interface.



- Use the **Place Text** command (**Drawing > Annotate > Text > Place Text**) to place the following text in the DGN. Before placing the text, consider the following:
  - What level should be used to place the text?
  - Which Text Style should be used?
  - Is the Annotation Scale lock toggled in on the Place Text tool settings?
  - Where should I place the text in relation to the completed sheet?

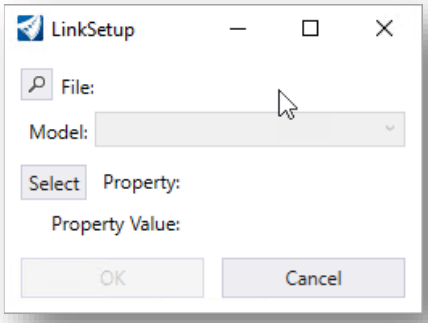


- After placing the text, open the **OHDOT Sheet Cross References** application (**Ohio DOT > Apps > Sheets > OHDOT Cross Refs**)



- Choose the **Select Text Element** button and then select the previously placed text. Then left click to accept the selection. The text string is displayed in the dialog.

- Choose the **Set Up New Link** button. This Link Setup dialog is opened as shown at right.

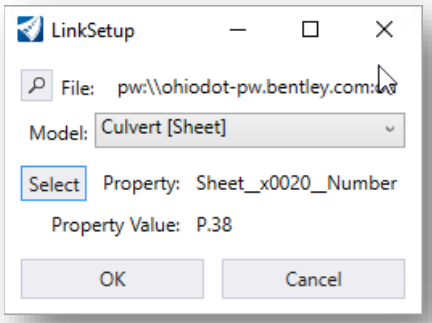


- Choose the **Browse** button to select the Culvert Detail Design file, located in the following folder:

  ..\78086\400-Engineering\ Drainage\Sheets\78086_DC001.dgn

- The file contains multiple models. Choose the **Culvert (Sheet)** model from the list.

- Choose the **Select** button to open the ***Property Selector*** dialog, shown at right.



- Select the **Sheet Number** property, and then choose the **OK** button.

- On the ***Link Setup*** dialog, choose the **OK** button to add the selected Property to the text string.

  The cross reference is added as a field to the end of the text string. The text string can be edited if the field is not deleted.

  Note that the cross references application also contains functions to update all the cross references in the active file, or to bulk update multiple files in the WorkSet. See the application documentation for more information.

- This completes this exercise. Exit ORD and check the file back into ProjectWise when prompted.

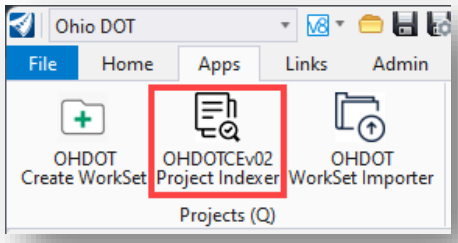
15 Project Indexer

The **OHDOTCEv02 Project Indexer** application is used to generate a Microsoft Excel file containing information about the project that is passed to the construction contractor. The Excel file documents the WorkSet design files with a description of each file, along with information about the alignments, terrain models, survey data, and 3D models.

In addition to the Excel file, the **OHDOTCEv02 Project Indexer** is used to generate a ZIP file containing the files for the plan submission.

Both the Excel file and the ZIP file are required for plans submitted to the Department. See the **Location and Design Manual – Volume 3**, section 1600 ODOT Guidelines for Electronic Deliverables for more information.

Within OpenRoads, the program is accessed from the Ohio DOT WorkFlow by selecting **Ohio DOT > Apps > OHDOTCEv02 Project Indexer**, as shown below.

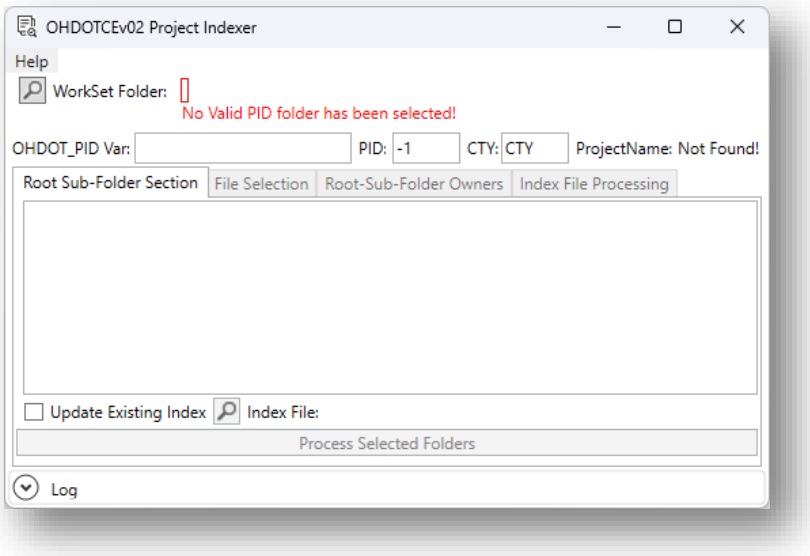


The program can also be launched external to OpenRoads from the following locations in ProjectWise Explorer:

03 Standards\CADD Standards\ CONNECT_Config\WorkSpaces\OHIODOTCEv02 \Standards\ Applications\OHIODOTv02_Indexer.exe

When the program is accessed, the dialog shown at right is opened.

See the application help for more information.

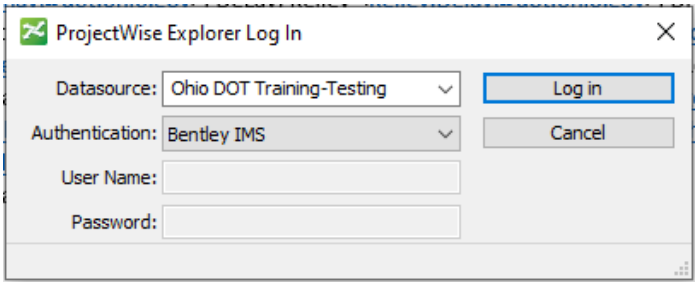


Exercise: Project Indexer

Part 1: Project Index Excel File

Take the following steps to generate the project index file for the sample project.

- Open **ProjectWise Explorer** if it is not currently open.
- When prompted, sign into ProjectWise as shown below.

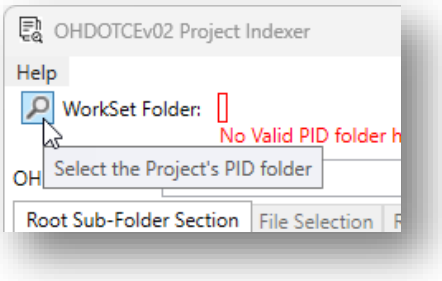


- Open the title sheet design file listed below, or any other DGN file in the WorkSet.

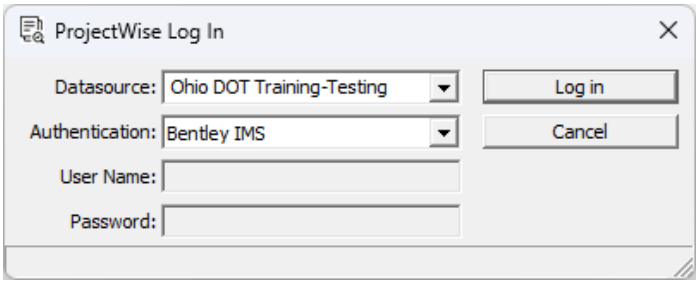
  Ohio DOT Training-Testing\Documents\06 Training Projects*User Name*\IntroToMicroStationTraining\78086\400-Engineering\Roadway\Sheets\78086_GT001.dgn

✓ Open the Project Indexer application by selecting **Ohio DOT > Apps > OHDOTCEv02 Project Indexer**.

✓ Select the PID folder for the WorkSet by choosing the selection button.



✓ When prompted, select the **Ohio DOT Training-Testing** Datasource using the **Bentley IMS** authentication as shown below.



✓ Select the PID folder for the sample project from your training file location:

.\06 Training Projects\username\IntroToMicroStationTraining\78086

✓ **The app will automatically generate the ProjectName**

Note: The application will be populated with the WorkSet information using the Project Indexer. The Project Indexer ***File Selection*** dialog is populated with information from the selected WorkSet folders.

✓ Next Select the **Project Folders**.

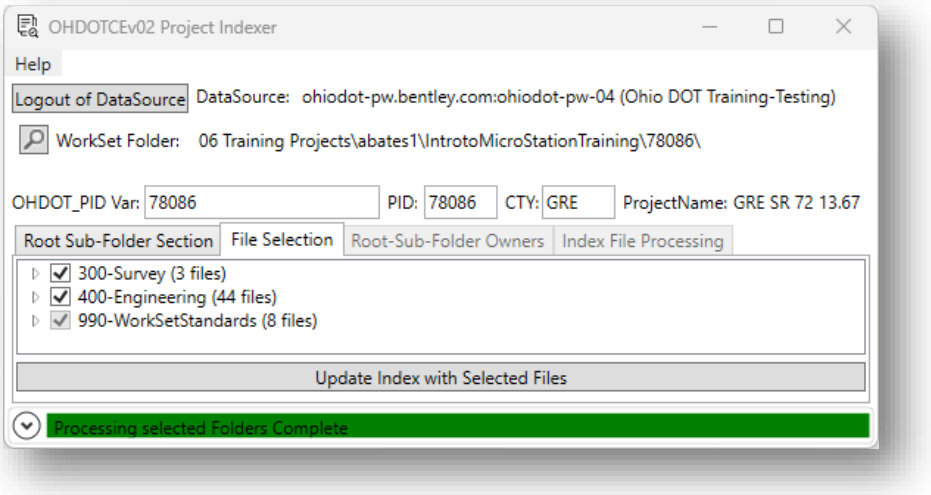
- 300 – Survey
- 400 – Engineering
- 990 – WorkSetStandards

✓ Click the **Process Selected Folders** button at the bottom of the application

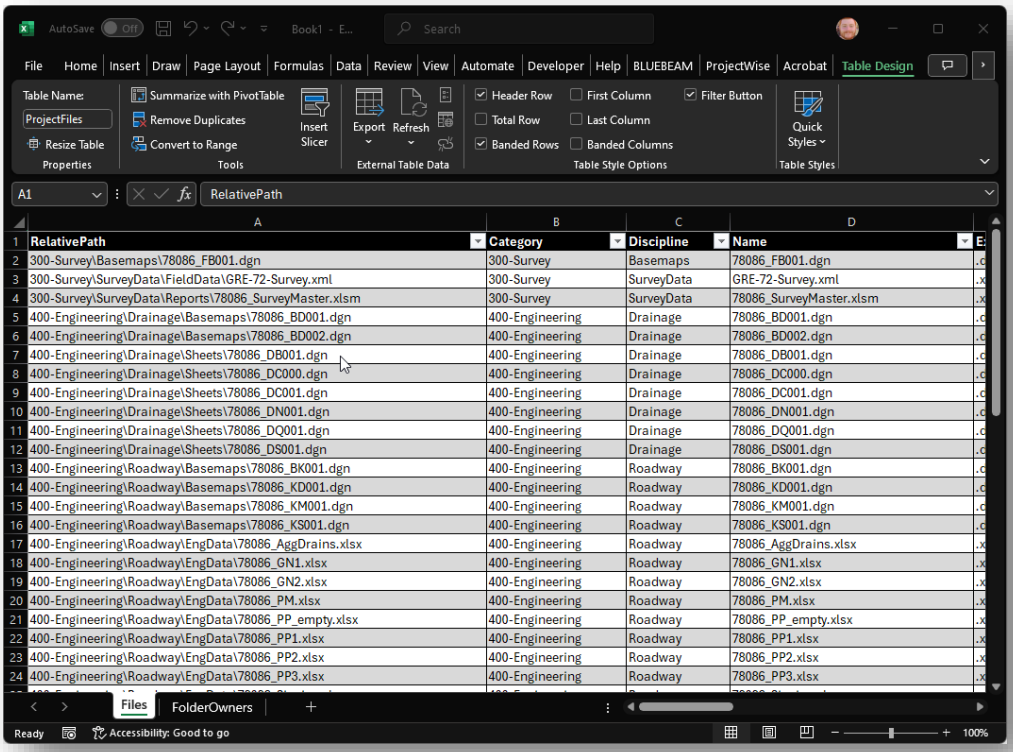
Each tab on the ***Project Indexer*** dialog is used to select file information that is then copied to the appropriate tab in the Excel file.

✓ Select the **Basemaps** in the ***Project Indexer*** dialog. A list of the basemap design file found in the WorkSet is listed.

✓ After selecting the files that you wish to list in the Excel file like the example shown below.

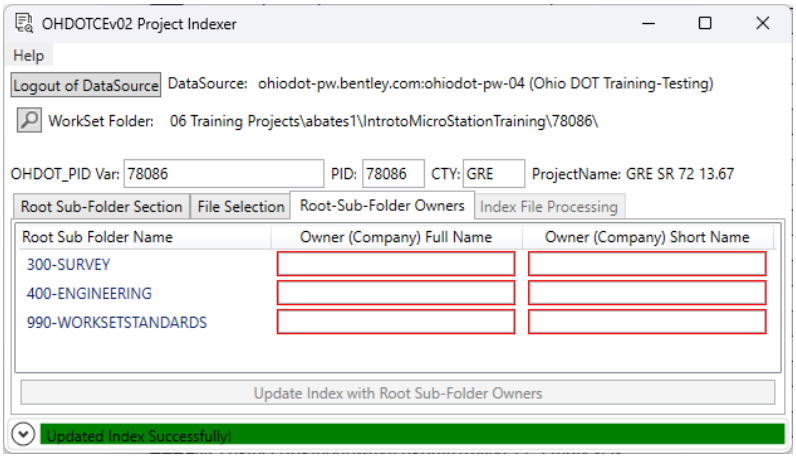


✓ Select the **Update Index with Selected Files** button. The data is populated in the Excel file like the example below.



	A	B	C	D
1	RelativePath	Category	Discipline	Name
2	300-Survey\Basemaps\78086_FB001.dgn	300-Survey	Basemaps	78086_FB001.dgn
3	300-Survey\SurveyData\FieldData\GRE-72-Survey.xml	300-Survey	SurveyData	GRE-72-Survey.xml
4	300-Survey\SurveyData\Reports\78086_SurveyMaster.xlsm	300-Survey	SurveyData	78086_SurveyMaster.xlsm
5	400-Engineering\Drainage\Basemaps\78086_BD001.dgn	400-Engineering	Drainage	78086_BD001.dgn
6	400-Engineering\Drainage\Basemaps\78086_BD002.dgn	400-Engineering	Drainage	78086_BD002.dgn
7	400-Engineering\Drainage\Sheets\78086_DB001.dgn	400-Engineering	Drainage	78086_DB001.dgn
8	400-Engineering\Drainage\Sheets\78086_DC000.dgn	400-Engineering	Drainage	78086_DC000.dgn
9	400-Engineering\Drainage\Sheets\78086_DC001.dgn	400-Engineering	Drainage	78086_DC001.dgn
10	400-Engineering\Drainage\Sheets\78086_DN001.dgn	400-Engineering	Drainage	78086_DN001.dgn
11	400-Engineering\Drainage\Sheets\78086_DQ001.dgn	400-Engineering	Drainage	78086_DQ001.dgn
12	400-Engineering\Drainage\Sheets\78086_DS001.dgn	400-Engineering	Drainage	78086_DS001.dgn
13	400-Engineering\Roadway\Basemaps\78086_BK001.dgn	400-Engineering	Roadway	78086_BK001.dgn
14	400-Engineering\Roadway\Basemaps\78086_KD001.dgn	400-Engineering	Roadway	78086_KD001.dgn
15	400-Engineering\Roadway\Basemaps\78086_KM001.dgn	400-Engineering	Roadway	78086_KM001.dgn
16	400-Engineering\Roadway\Basemaps\78086_KS001.dgn	400-Engineering	Roadway	78086_KS001.dgn
17	400-Engineering\Roadway\EngData\78086_AggDrains.xlsx	400-Engineering	Roadway	78086_AggDrains.xlsx
18	400-Engineering\Roadway\EngData\78086_GN1.xlsx	400-Engineering	Roadway	78086_GN1.xlsx
19	400-Engineering\Roadway\EngData\78086_GN2.xlsx	400-Engineering	Roadway	78086_GN2.xlsx
20	400-Engineering\Roadway\EngData\78086_PM.xlsx	400-Engineering	Roadway	78086_PM.xlsx
21	400-Engineering\Roadway\EngData\78086_PP_empty.xlsx	400-Engineering	Roadway	78086_PP_empty.xlsx
22	400-Engineering\Roadway\EngData\78086_PP1.xlsx	400-Engineering	Roadway	78086_PP1.xlsx
23	400-Engineering\Roadway\EngData\78086_PP2.xlsx	400-Engineering	Roadway	78086_PP2.xlsx
24	400-Engineering\Roadway\EngData\78086_PP3.xlsx	400-Engineering	Roadway	78086_PP3.xlsx

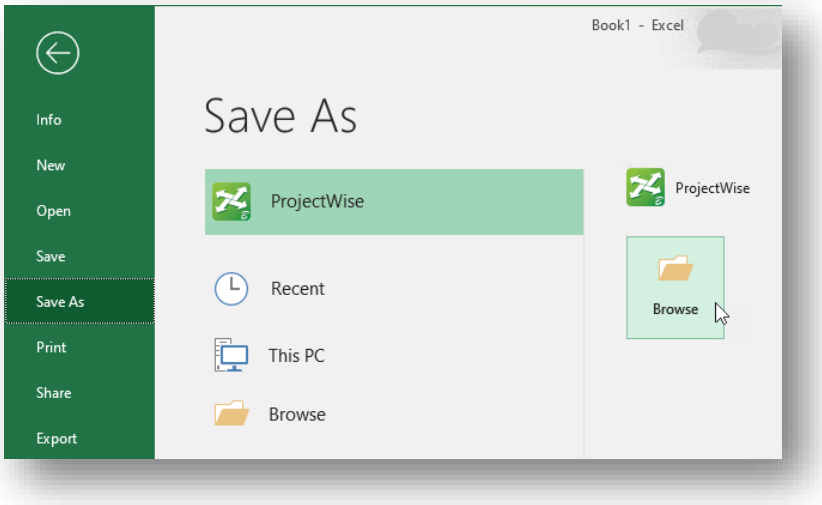
After selecting the **Update Index with Selected Files** button in the ***Project Indexer*** dialog. The Root-Sub-Folder Owners tab will become active. The user will then be promted to fill out the **Owners**.



✓ After filling out the Owners fields **select Update Index with Root Sub-Folder Owner** button. This will import that data into the Excel file under the **FolderOwners** tab.

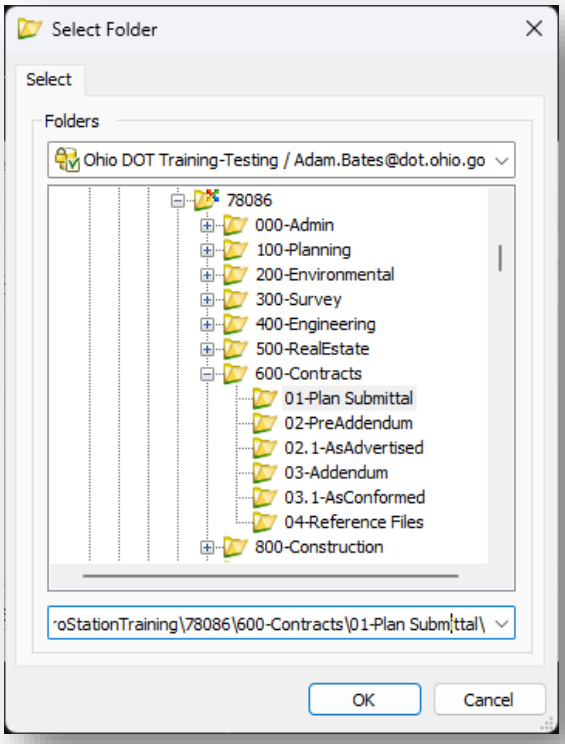
✓ Save the Excel file in the location shown on the next page.

- Choose **File > Save As** in Excel. Then choose **ProjectWise> Browse** option as shown below.



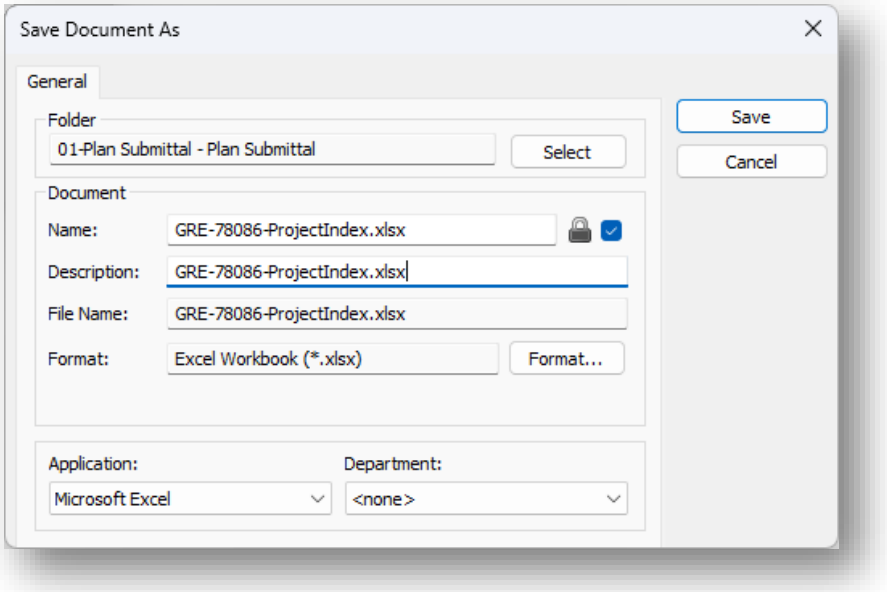
✓ When prompted, log into ProjectWise. Choose the **No Wizard** option.

✓ Choose the **600-Contracts\01-Plan Submittal** folder as shown below.



The project index file is named according to the **Location and Design Manual – Volume 3, section 1603.3.**

✓ Name the file **GRE-78086-ProjectIndex.xlsx**

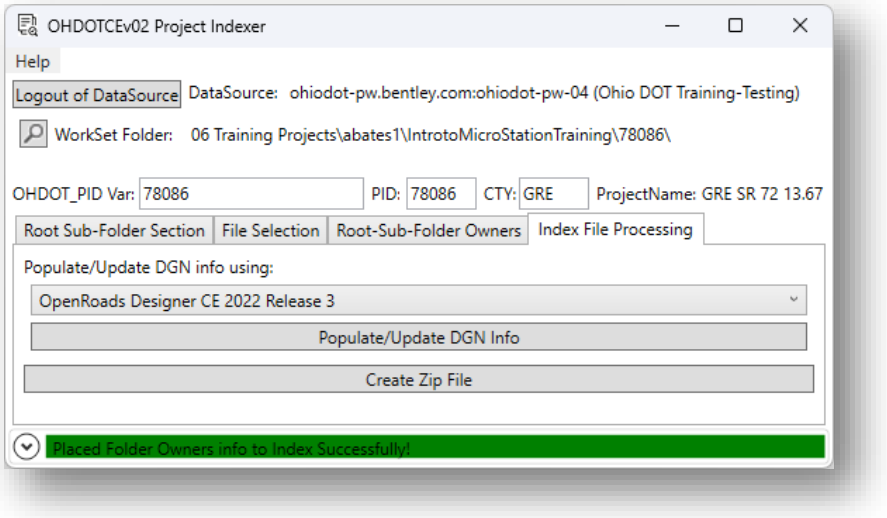


✓ Select save file. Don't close the Excel.

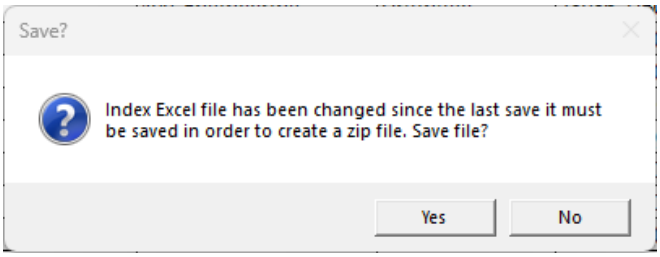
Part 2: Create the ZIP file for the WorkSet

Take the following steps to create a ZIP file for the WorkSet.

✓ From the ***Project Index*** dialog, select the **Populate/Update DGN Info** option.



✓ Choose the corresponding software used on the project from the dropdown. Then select button Populate/Update DGN Info to update the project DGN files.
✓ The user must save the ProjectIndex file, or the user will receive the prompt shown on the next page.



- ✓ Select the **Create Zip File. See Location and Design Manual – Volume 3 section 1600** for the save location.

- ✓ This completes the OHDOTCEv02 Project indexer exercise.

16 Print Organizer

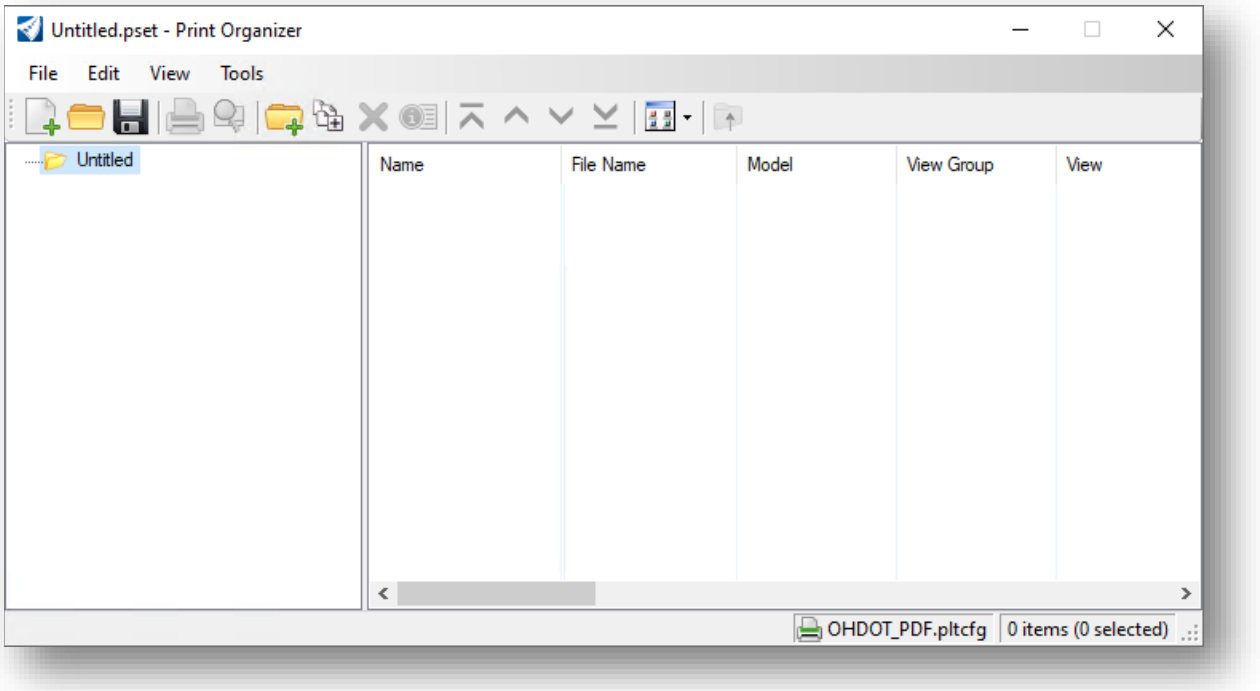
Printing Multi-Page PDF Files: Process Overview

The **Print Organizer** is a MicroStation utility for printing and reprinting a set of design files, models, or Project Explorer links. The files that are to be printed are saved as a print set file (.pset).

The steps to create and print a multi-page PDF are summarized below:

- Select **File > Print > Print Organizer** to launch the application.
- The ***Print Organizer*** dialog will default to the last print driver that was used when the application was opened.

  The current print driver is listed at the bottom right of the dialog as shown below. You can click on the name of the print driver to select a different driver.



The OHDOT WorkSpace provides several Print Drivers, listed below.

OHDOT.pltcfg
Select this print driver to print full size or quarter size plan sheets.

OHDOT_L.pltcfg
This print drive is used to print letter size (8.5” x 11”) plan sheets.

OHDOT_PDF.pltcfg
Select this print driver to create a multi-page PDF file.

OHDOT_PDF_Color.pltcfg
Select this print driver to create a multi-page PDF file in color.

OHDOT_PDF_Levels.pltcfg
Use this print driver to create a multi-page PDF with levels. Note: The resulting PDF file size can be quite large when using this option.

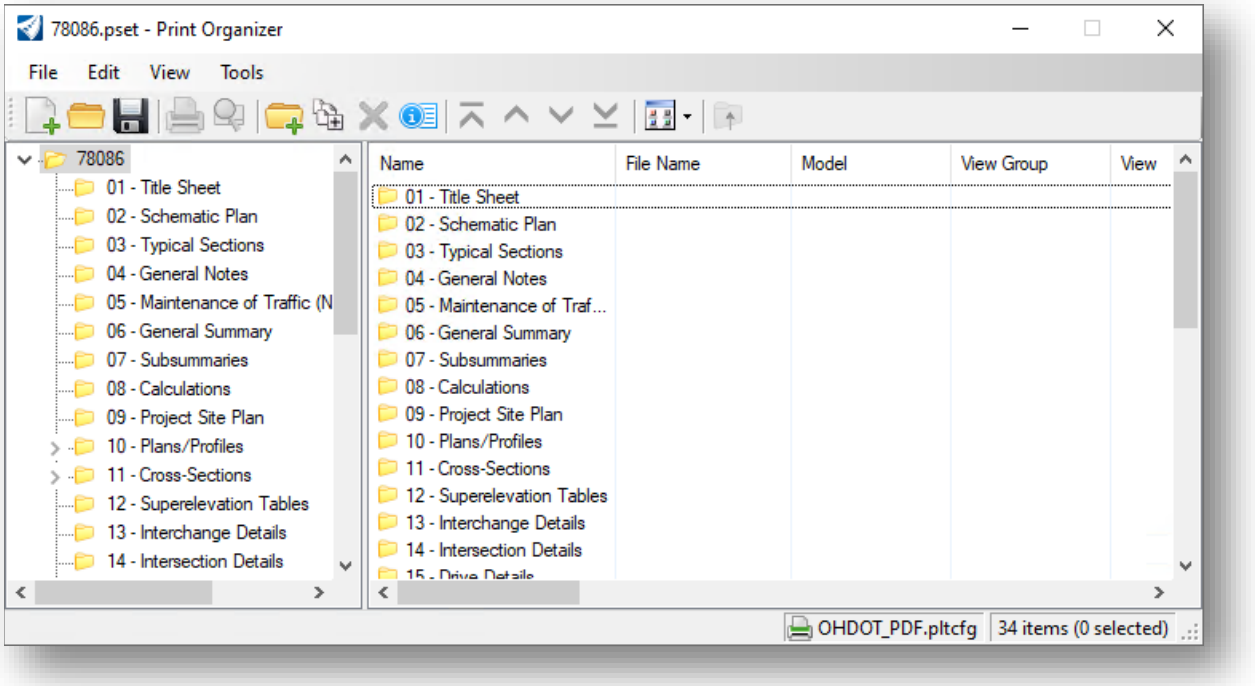
- Select the PSET file.

  The application uses a PSET (.pset) file to organize the prints into various categories that are used to create bookmarks withing the PDF print set. When a project is created using the **OHDOT Create Workset** utility, a .pset file is created for the project. The file is named using the PID number for the project and is located under the following folder:

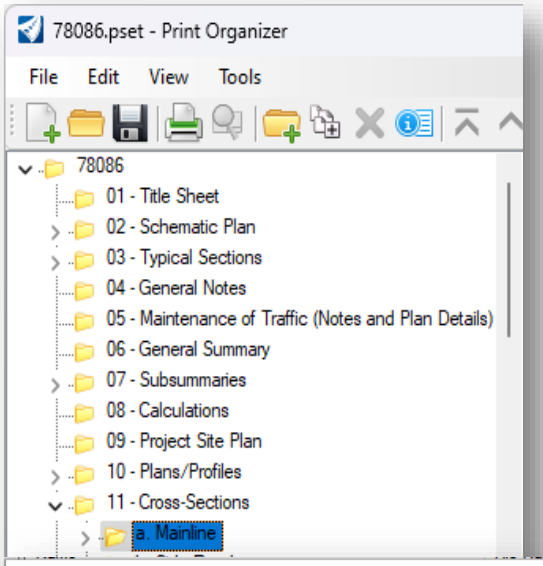
  \######\990- WorkSet Standards\Plotdrv\######.pset

  Where ###### = the PID number.

  The PSET file is prepopulated with folders to organize the design files that will make up the print set as shown below.



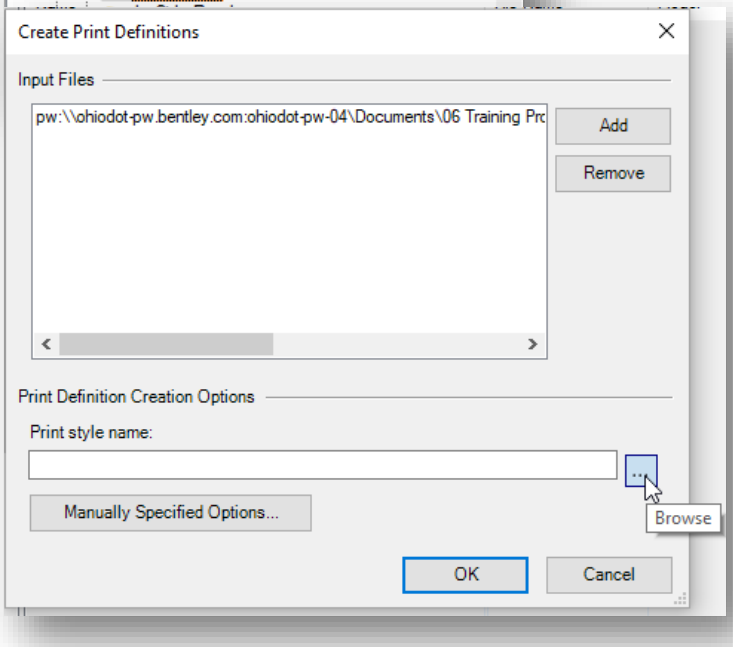
- Add the design files that will be included in the print set to the ***Print Organizer***. This is accomplished by selecting the folder and then using the **Add files to Set** icon.



In the example to left, files will be added to the **11- Cross Sections > a. Mainline** folder.

When the **Add Files to Set** button is selected, the ***Create Print Definitions*** dialog shown below is opened. This dialog is used to select the file(s) to add to the print set under the currently selected folder.

Note: Only Sheet models from the selected file(s) are included in the print set. Design and Drawing models are not included in the print set.

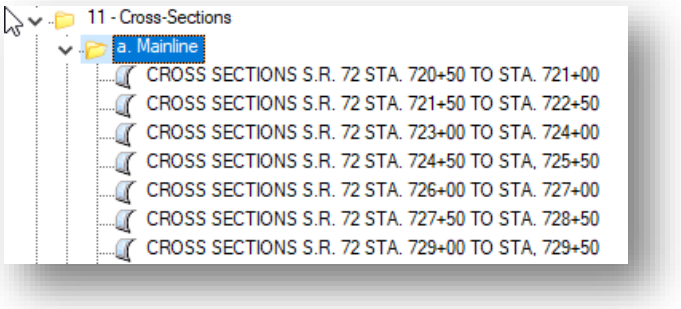


After selecting the file(s) to add to the print set, choose the Browse button to define a Print Style for the added files.

Several print styles are available in the OHDOT Standards. If you do not select a print style, the default style will be applied.

As files are added to the print set, the Sheet Model properties are read to get the **Description** value, which is used for the sheet name in the print set. The **Description** property is populated with the **Sheet Name** and the **Sheet Sub-Title** when the **OHDOT Sheet Manager** application is used.

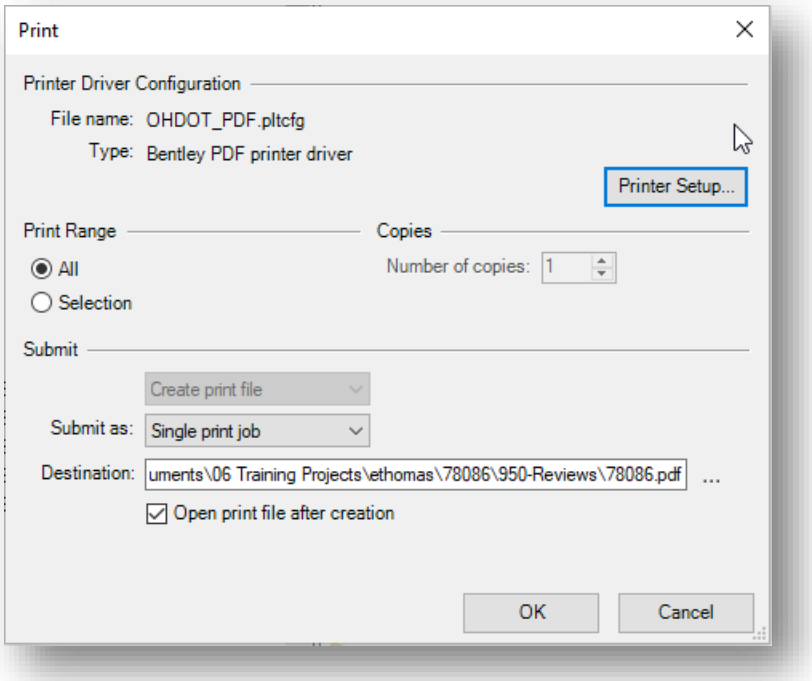
In the example below, the name for each cross-section sheet, as read from the model **Description** property, is assigned as shown. This name is used as the bookmark name in the completed PDF file for the plan set.



- After adding all the sheet design files to the **Print Organizer**, choose the **Print** icon to create a PDF file for the print set.

  Tips:
  - The PDF is created from the folder that is currently selected in the Print Organizer dialog. Be sure to choose the top-level PID number folder before choosing the Print command to create a PDF for the entire plan set.
  - Only the folders that have been populated with design files in the **Print Organizer** are displayed as bookmarks in the completed PDF. Unnecessary folders can be deleted in the Print Organizer if desired.
  - Folders may be renamed if desired, keeping in mind that the folder names will be included in the PDF as bookmarks.

  The ***Print*** dialog is shown on the following page.

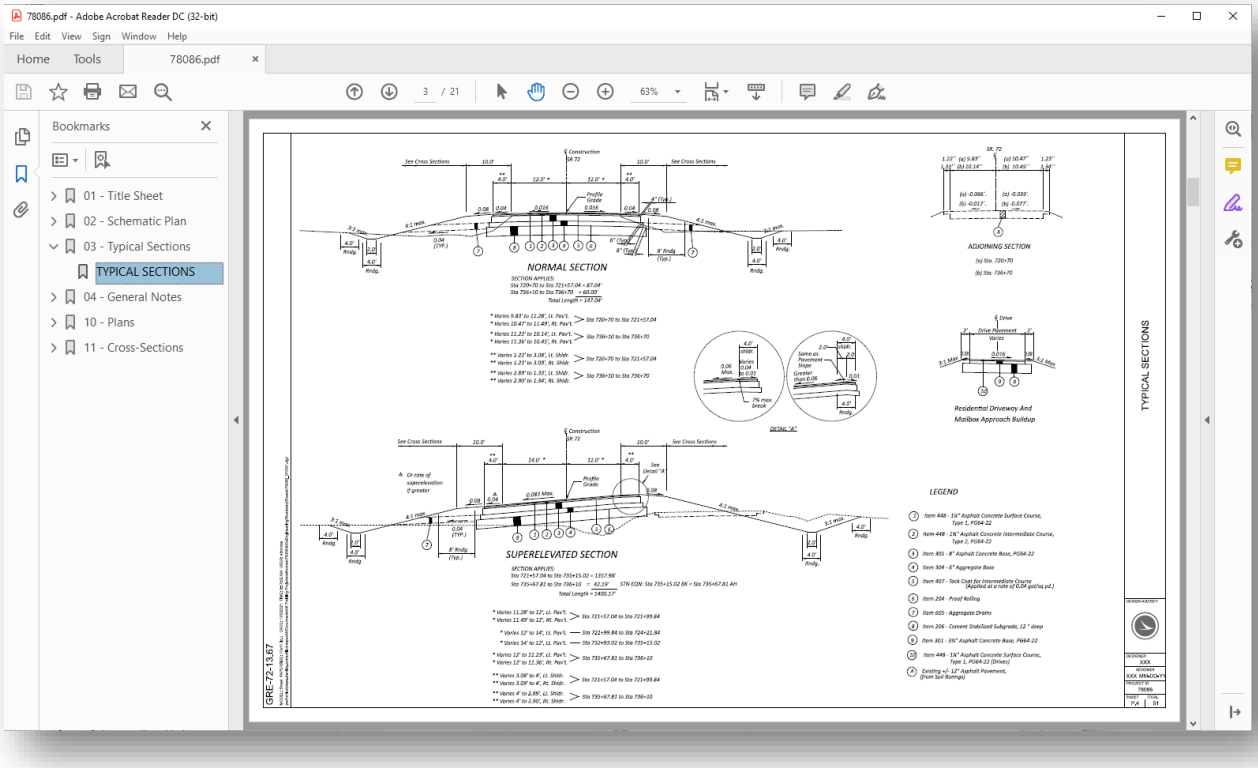


Choose the Destination path for the PDF. The PDF is typically saved to the following folder within the WorkSet:

\######\950- Reviews\######.pdf

Where ###### = the PID number.

- The completed PDF is organized by the order of the folders and files listed in the Print Organizer dialog. Bookmarks for each folder in the plan set that contains a file are created for the PDF file as shown in the example below.



- After the PDF file has been generated, be sure to save the PSET file settings. Choose **File > Save** from the *Print Organizer* dialog to save the PSET file.

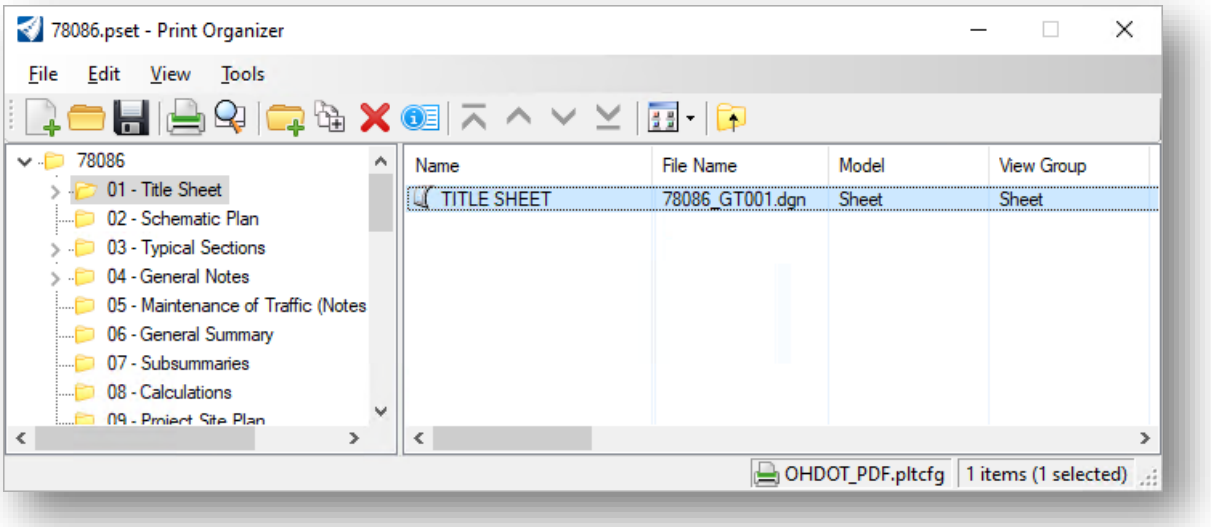
Updating a Print Set

A previously saved PSET file can be opened and reused to generate a new set of prints, or a new PDF file as needed.

- The PSET file contains a "snapshot" of the design file settings at the time the print set was created.
- The PSET file is not dynamically linked to the design files and must be updated if any changes have been made to the design files settings, such as turning on or off levels, or changing the view attribute settings, since the time the PSET file was created.
- It is not necessary to update the PSET file to capture any changes to the elements drawn in the design files since the time the PSET for was created.

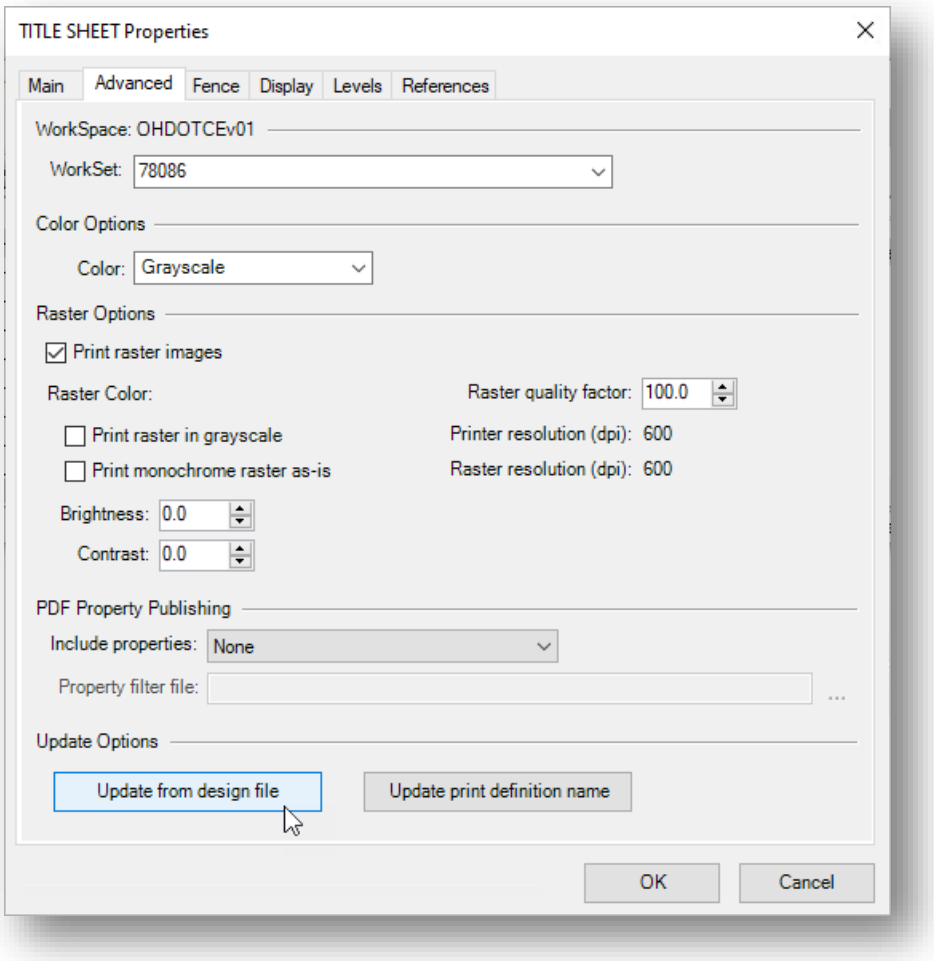
Take the following steps to update individual sheets in print set:

- Start **Print Organizer** by selecting **File > Print > Print Organizer**.
- Open the PSET file.
- From the ***Print Organizer*** dialog, select file to update.



- From the ***Print Organizer*** dialog, select **Edit > Properties**, or the **Properties** icon, to access the ***Modify Properties*** dialog shown on the following page.

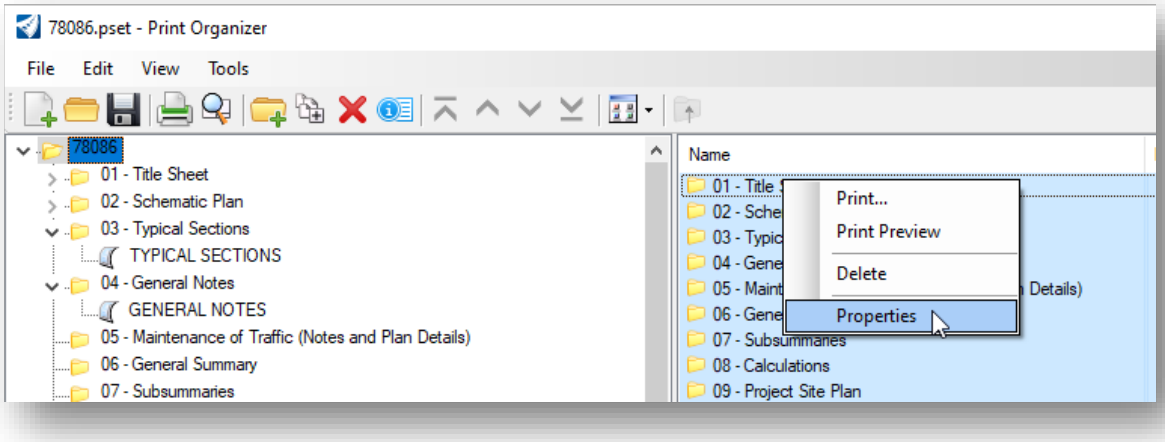
- Select the **Advanced** tab.
- Toggle on the **Update from design file** option.



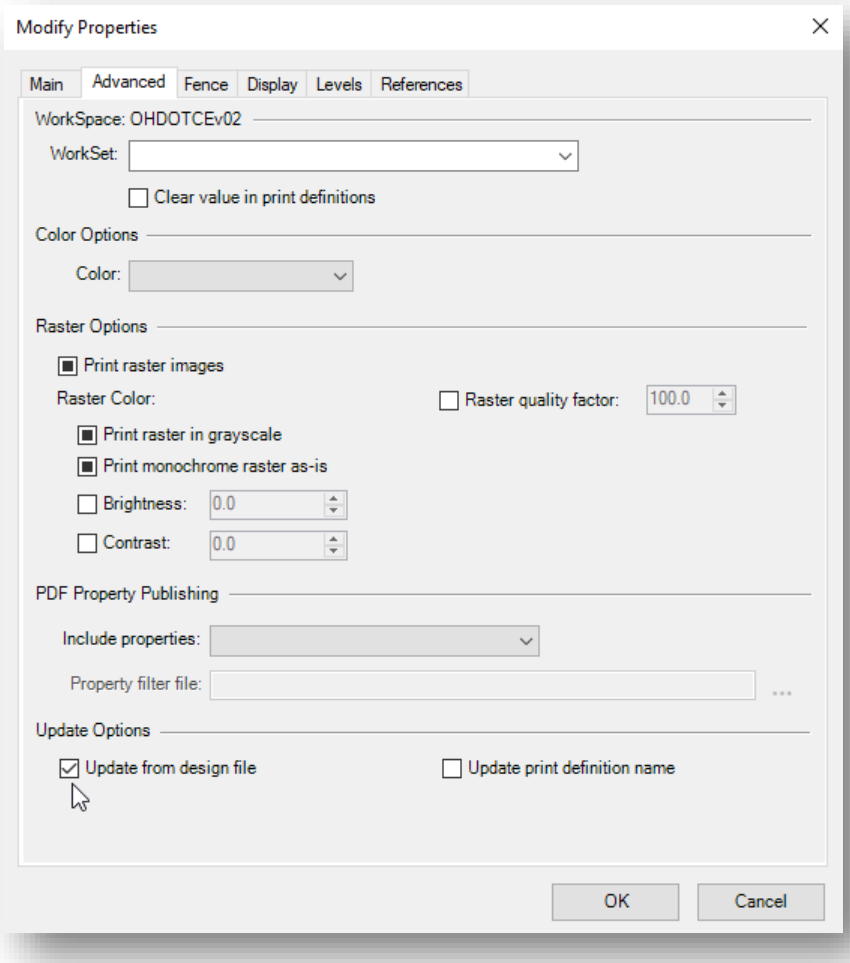
- Choose **OK** to initiate the process. The PSET is updated by reading the selected file.
- After the PSET has been updated, proceed to print the files, or create a new PDF as necessary.

Take the following steps to update all the sheets in print set:

- Start **Print Organizer** by selecting **File > Print > Print Organizer**.
- Open the PSET file.
- From the ***Print Organizer*** dialog, select the top level PID folder. On the right-side of the dialog, select all the folders as shown below.



- Right click on one of the folders and choose the **Properties** option.



From the ***Modify Properties*** dialog, select the **Advanced** tab.

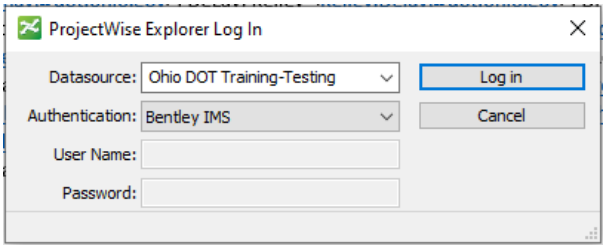
Toggle on the **Update from design file** option as shown at left.

Select **OK** to initiate the process.

Exercise: Creating a Multi-Page PDF with Print Organizer

Using this chapter as a guide, create a multi-page PDF file for the sample project.

- Open **ProjectWise Explorer** if it is not currently open.
- When prompted, sign into ProjectWise as shown below.



- Open the title sheet design file listed below, or any other DGN file in the WorkSet.

  ..\IntroToMicroStationTraining\78086\400-Engineering\Sheets\78086_GT001.dgn

✓ Open the **Print Organizer** application by selecting **File > Print > Print Organizer**.

✓ The currently selected print driver is listed at the lower right of the dialog. Select the desired print driver by clicking on the name of the current print driver. For this example, we will use the **OHDOT.pset** file.

✓ From the **Print Organizer** dialog, select **File > Open** to open the PSET file from the following location:

...\78086\990-WorkSetStandards\Plotdrv\78086.pset

✓ Populate the PSET dialog with the design files for the project. Make sure to import the design files into the proper sub-folders within the *Print Organizer* dialog.

✓ Create the PDF file.

✓ After reviewing the PDF, close the PDF file.

✓ Save the PSET file.

✓ Close OpenRoads and check the design file back into ProjectWise.

✓ Close ProjectWise Explorer. This concludes the exercise.